

Sources of Variability in Rock Hardness During Crater Blasting

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Abstract

Similar rock formations exhibit great variability in resistance to fragmentation during crater blasting. This observation was made during an attempt to calibrate the Kuz-Ram blast fragmentation model for crater blast geometries used in a modified in situ mining method for copper. The KuzRam equation is used to predict the fragment size distribution from blasting and includes a term called the "rock factor" to account for the fragmentation characteristics of the material. A data base of field scale crater shots in oil shale was available to supplement more limited data on copper ores. First, the blast geometry terms of the Kuz-Ram formula were modified to fit field data with various crater blast geometries. Rock factors were chosen to center the predicted curve on the curve representing observed fragmentation. Next, five possible sources of variability in rock factor were investigated: the grade of the oil shale, the aspect ratio of the charge, the type of explosive, the charge depth, and the rock itself.

This study discloses that both grade and charge depth have a noteworthy effect on the rock factor; however, aspect ratio and explosive type do not. A significant variability in rock factor, not explainable by blast design or geology, is also noted.