

ABSTRAK

Penelitian ini membandingkan dua pendekatan geostatistik, yaitu OK dan MIK, dalam estimasi sumber daya timbal (Pb) pada endapan Blok *Gossan* yang memiliki geometri kompleks akibat sistem hidrotermal. OK dikenal dalam memprediksi nilai rata-rata berdasarkan variogram, namun kurang efektif dalam menangkap distribusi kadar yang heterogen. Sebaliknya, MIK lebih adaptif terhadap distribusi non-normal dan kadar ekstrem. Berdasarkan evaluasi akurasi, MIK menunjukkan kinerja yang lebih baik dengan koefisien determinasi (R^2) sebesar 0,964, koefisien korelasi (r) sebesar 0,982, dan *Root Mean Square Error* (RMSE) sebesar 0,432. Sebagai perbandingan, OK menghasilkan koefisien determinasi (R^2) sebesar 0,927, koefisien korelasi (r) sebesar 0,963, dan RMSE sebesar 0,570. Klasifikasi sumber daya berdasarkan nilai *average distance* metode OK menghasilkan 565.305 ton *measured*, 993.397 ton *indicated*, dan 43.095 ton *inferred*, sedangkan MIK menghasilkan 220.147 ton *measured*, 446.475 ton *indicated*, dan 17.317 ton *inferred*. Kurva hubungan antara kadar dan tonase pada kedua metode menunjukkan tren negatif, yaitu peningkatan *cut-off grade* akan menurunkan nilai tonase. Berdasarkan hasil validasi dan evaluasi akurasi, MIK dipilih sebagai metode estimasi yang lebih sesuai dengan karakteristik geologi Blok *Gossan* dalam penaksiran sumber daya timbal.

Kata kunci: Ordinary Kriging, Multiple Indikator Kriging, RMSE

SUMMARY

This study compares two geostatistical approaches, namely OK and MIK, in estimating lead (Pb) resources in the Gossan Block deposit which has a complex geometry due to the hydrothermal system. OK is known to predict the average value based on the variogram, but is less effective in capturing heterogeneous grade distributions. In contrast, MIK is more adaptive to non-normal distributions and extreme grades. Based on the accuracy evaluation, MIK shows better performance with a coefficient of determination (R^2) of 0.964, a correlation coefficient (r) of 0.982, and a Root Mean Square Error (RMSE) of 0.432. In comparison, OK produces a coefficient of determination (R^2) of 0.927, a correlation coefficient (r) of 0.963, and a RMSE of 0.570. The resource classification based on the average distance value using the OK method yielded 565,305 measured tons, 993,397 indicated tons, and 43,095 inferred tons, while the MIK yielded 220,147 measured tons, 446,475 indicated tons, and 17,317 inferred tons. The relationship between grade and tonnage using both methods shows a negative trend, meaning that increasing the cut-off grade decreases the tonnage value. Based on the validation results and accuracy evaluation, MIK was selected as the estimation method that best suits the geological characteristics of the Gossan Block in estimating lead resources.

Keywords: Ordinary Kriging, Multiple Indicator Kriging, RMSE