

ABSTRAK

ESTIMASI SUMBER DAYA PASIR BESI DI PANTAI KULON PROGO DENGAN METODE *NEAREST NEIGHBOUR POINT* DAN *INVERSE DISTANCE WEIGHTING*

Oleh
Alifa Sandra Puspita Sari
NIM: 112210032
(Program Studi Sarjana Teknik Pertambangan)

Endapan pasir besi di pesisir selatan Kabupaten Kulon Progo terbentuk dari pelapukan batuan vulkanik yang tertransportasi dan terakumulasi pada lingkungan pantai sehingga diperlukan estimasi sumber daya yang akurat sebagai dasar perencanaan tambang. Penelitian ini bertujuan membangun model geologi endapan pasir besi serta membandingkan estimasi sumber daya menggunakan metode *Nearest Neighbour Point* (NNP) dan *Inverse Distance Weighting* (IDW). Data yang digunakan terdiri atas 929 titik bor dengan 14.467 sampel kadar Fe yang meliputi data *collar*, *survey*, geologi, dan *assay*. Pengolahan data dilakukan melalui tahapan validasi data, *compositing* interval 1 m, analisis statistik deskriptif, pemodelan geologi tiga dimensi, dan pembangunan *block model* berukuran 50 m × 12,5 m × 1 m menggunakan perangkat lunak Studio RM. Evaluasi akurasi estimasi dilakukan melalui perbandingan statistik antara data komposit dan hasil estimasi serta perhitungan *Root Mean Square Error* (RMSE). Hasil estimasi menunjukkan kadar rata-rata Fe pada satuan *Fine Sand* (Fs) sebesar 13,60% menggunakan metode NNP dan 13,71% menggunakan metode IDW, sedangkan pada satuan *Coarse Sand* (Cs) sebesar 7,37% pada metode NNP dan 7,35% pada metode IDW. Nilai RMSE metode NNP sebesar 0,37 pada Fs dan 0,14 pada Cs, sedangkan metode IDW menghasilkan nilai RMSE sebesar 1,50 pada Fs dan 0,45 pada Cs. Hasil klasifikasi sumber daya berdasarkan parameter *average distance* menunjukkan total sumber daya sebesar 305.222.022 m³ yang terdiri atas 104.786.339 m³ sumber daya terukur, 163.782.577 m³ sumber daya tertunjuk, dan 36.653.106 m³ sumber daya tereka. Secara keseluruhan, metode NNP menunjukkan tingkat akurasi yang lebih baik dalam merepresentasikan distribusi kadar pada endapan pasir besi dengan geometri relatif sederhana dan kadar yang cenderung homogen.

Kata kunci: *Block Model*, Estimasi Sumber Daya, IDW, NNP, Pasir Besi.

ABSTRACT

IRON SAND RESOURCE ESTIMATION IN KULON PROGO COASTAL AREA USING NEAREST NEIGHBOUR POINT AND INVERSE DISTANCE WEIGHTING METHODS

By

Alifa Sandra Puspita Sari

NIM: 112210032

(Mining Engineering Undergraduated Program)

Iron sand deposits along the southern coast of Kulon Progo Regency are formed from the weathering of volcanic rocks that are transported and accumulated in coastal environments, therefore accurate resource estimation is required as a basis for mine planning. This study aims to construct a geological model of the iron sand deposit and compare resource estimation results using the Nearest Neighbour Point (NNP) and Inverse Distance Weighting (IDW) methods. The dataset consists of 929 drill holes with 14,467 Fe assay samples including collar, survey, geology, and assay data. Data processing involved data validation, 1 m compositing, descriptive statistical analysis, three-dimensional geological modelling, and block model construction with dimensions of 50 m × 12.5 m × 1 m using Studio RM software. Estimation accuracy was evaluated through statistical comparison between composite data and estimation results as well as the calculation of Root Mean Square Error (RMSE). The estimation results show that the average Fe grade in the Fine Sand (Fs) unit is 13.60% using the NNP method and 13.71% using the IDW method, while the Coarse Sand (Cs) unit shows average grades of 7.37% for NNP and 7.35% for IDW. The RMSE values of the NNP method are 0.37 for Fs and 0.14 for Cs, while the IDW method produces RMSE values of 1.50 for Fs and 0.45 for Cs. Resource classification based on the average distance parameter indicates a total resource of 305.222.022 m³ consisting of 104.786.339 m³ of measured resources, 163.782.577 m³ of indicated resources, and 36.653.106 m³ of inferred resources. Overall, the NNP method provides better accuracy in representing grade distribution for iron sand deposits with relatively simple geometry and relatively homogeneous grade distribution.

Keywords: Block Model, IDW, Iron Sand, NNP, Resource Estimation.