

INTISARI

Daerah Sorowako, Kabupaten Luwu Timur, Provinsi Sulawesi Selatan berdiri salah satu tambang nikel terbuka yang merupakan bagian dari Kontrak Karya PT Vale Indonesia Tbk. Proses penambang nikel diperlukan suatu kajian geoteknik sehingga penelitian ini dilakukan untuk mengetahui nilai Faktor Keamanan (FK) dan Probabilitas Kelongsoran (PK) lereng keseluruhan sesuai standar Keputusan Menteri ESDM No. 1827.K/30/MEM/2018 dan memberikan rekomendasi geometri lereng yang aman berdasarkan hasil penyelidikan karakteristik geologi teknik pada rencana penambangan Blok Mahalona PT Vale Indonesia Tbk. Metode yang digunakan adalah metode probabilistik dan *LEM Morgenstern-Price* dengan pendekatan sifat indeks dan mekanik tanah (berat volume, kohesi, dan ϕ) terhadap desain awal lereng (45° slope, 10 meter tinggi, dan 7 meter lebar lereng). Data sifat indeks dan mekanik tanah tersebut dilakukan uji statistik dan *fitting test* menggunakan *software Matlab R2024b* sehingga diperoleh statistika nilai dan distribusi data terbaik. Nilai-nilai tersebut diolah untuk mendapatkan nilai FK dan PK menggunakan *software Geostudio Slope/W 2023.1*.

Pemodelan dilakukan melalui analisis variasi muka air tanah dan faktor seismik dengan asumsi getaran gempa setengah dari variasi nilai PGA 0.15g-0.2g. Hasil penelitian menunjukkan bahwa desain awal *section A'-A*, *B'-B*, dan *C'-C* tidak memenuhi nilai FK statis standar meskipun nilai PK telah sesuai. Sehingga *section A'-A* dan *B'-B* dilakukan perubahan geometri *slope* dari 45° menjadi 33° sebaliknya *section C'-C* dilakukan perubahan geometri *slope* dan lebar lereng menjadi 33° slope, 10 meter tinggi, dan 10 meter lebar lereng. Dari perubahan geometri lereng tersebut, *section A'-A* didapatkan nilai FK statis 1.42, PK 0%, FK dinamis 1.13, dan FK jenuh 1.05, *section B'-B* diperoleh nilai FK statis 1.51, PK 0%, FK dinamis 1.18, dan FK jenuh 1.4, dan *section C'-C* mendapatkan hasil perhitungan nilai FK statis 1.31, PK 0%, FK dinamis 1.1, dan FK jenuh 1.07. Melalui perubahan tersebut, dinyatakan ketiga *section* telah memenuhi standar Keputusan Menteri ESDM No. 1827.K/30/MEM/2018.

Kata kunci: Blok Mahalona PT Vale Indonesia Tbk, penyelidikan karakteristik geologi teknik, kestabilan lereng, metode probabilistik, rekomendasi lereng.

ABSTRACT

The Sorowako area in East Luwu Regency, South Sulawesi Province, there is one of the open pit nickel mines which is part of the Contract of Work of PT Vale Indonesia Tbk. The nickel mining process requires a geotechnical study of the slope, aims to determine the value of the Safety Factor (SF) and the Probability of Failure (PoF) of the overall slope according to the standards set by the Minister of Energy and Mineral Resources Regulation No. 1827.K/30/MEM/2018 and provide recommendations for safe mine slope geometry based on the results of the investigation of engineering geological characteristics at the planned mining site of Block Mahalona PT Vale Indonesia Tbk. The method used is the probabilistic method and the Morgenstern-Price limit equilibrium with the approach of soil index and mechanical properties (unit weight, cohesion, and friction angle) to the initial slope design (45° slope, 10 meters high, and 7 meters wide slope). The index and mechanical properties of the soil were subjected to statistical tests and fitting tests using Matlab R2024b software to obtain statistical data and best data distribution. These values were processed to obtain SF and PoF values using Geostudio Slope/W 2023.1 software.

Modeling was carried out through analysis of variations in groundwater level (GWL) conditions and seismic factors assuming half of the earthquake vibration from the variation of PGA values of 0.15g-0.2g. The results of the study show that the initial design of sections A'-A, B'-B, and C'-C didn't meet the standard of static SF values even though the PoF values were acceptable. Therefore, the geometry of the slope for sections A'-A and B'-B was altered from 45° to 33°, while the slope and width for section C'-C were subjected to changes to a 33° slope, 10 meters high, and 10 meters wide. From these geometry changes, the static SF value for section A'-A was 1.42, PoF 0%, dynamic SF 1.13, and saturated SF 1.05; section B'-B, the static SF was 1.51, PF 0%, dynamic SF 1.18, and saturated SF 1.4; and section C'-C, the static SF value was 1.31, PF 0%, dynamic SF 1.1, and saturated SF 1.07. Through these changes, it is stated that the three sections have met the standards of the Minister of Energy and Mineral Resources Decree No. 1827.K/30/MEM/2018.

Keywords: Mahalona Block PT Vale Indonesia Tbk, engineering geological characteristic investigation, slope stability, probabilistic method, slope recommendations.