Arahan Pengelolaan Lereng Pit Gajah Berdasarkan Kestabilan Lereng Pada PT. X, Kecamatan Segah, Kabupaten Berau, Kalimantan Timur

Ilmam Farizi
114210075

INTISARI

PT. X bergerak dalam sektor pertambangan batu bara. Perusahaan ini berfokus pada eksplorasi, penambangan, dan distribusi batu bara. PT. X menerapkan sistem tambang terbuka (*open pit*) yang menyebabkan perubahan lahan dan membentuk lereng. Pada PIT Gajah terdapat lereng yang memiliki geometri lereng yang curam. Selain itu sifat fisik dan sifat mekanik tanah sebagai material penyusun lereng yang terdampak curah hujan yang tinggi juga sangat berpengaruh terhadap tingkat kestabilan lereng. Stabilitas lereng perlu mendapat perhatian khususnya di area tambang dan PIT aktif karena dapat mengganggu dan mengancam keselamatan kerja. Penelitian ini bertujuan untuk mengetahui kondisi lereng berdasarkan sifat fisik dan mekanik tanah, dan mengetahui nilai faktor keamanan lereng yang dijadikan sebagai acuan dalam memberikan rekomendasi arahan pengelolaan yang sesuai.

Penelitian ini menggunakan metode analisis kuantitatif dan kualitatif yang didasarkan pada data hasil survei lapangan, pemetaan, serta pengujian laboratorium. Pengambilan sampel tanah dilakukan dengan teknik *purposive sampling*, dimana sampel tanah tidak terganggu diambil sesuai dengan spesifikasi ASTM D-1587 untuk keperluan pengujian berat isi, kadar air, sudut geser dalam, dan permeabilitas tanah. Sementara itu, sampel tanah terganggu digunakan untuk analisis karakteristik fisik tanah, meliputi ukuran butir, batas cair, indeks plastisitas, dan porositas. Penentuan nilai faktor keamanan lereng dilakukan melalui analisis kestabilan lereng menggunakan metode Janbu yang disederhanakan, dengan bantuan perangkat lunak *Rocscience Slide*. Hasil analisis tersebut kemudian dievaluasi secara deskriptif dengan mengacu pada klasifikasi Faktor Keamanan menurut Bowles (1989) serta Pedoman Pelaksanaan Kaidah Teknik Pertambangan yang Baik sebagaimana diatur dalam Keputusan Menteri ESDM No. 1827 K/30/MEM/2018.

Kondisi lereng berdasarkan sifat fisik dan mekanik tanah diperoleh nilai berat isi tanah 17,763 N/cm3 , kadar air 26,143 %, kohesi 26,894 kPa dan sudut geser dalam 29,05^{o} untuk lereng A. Sedangkan lereng B memiliki nilai berat isi 17,329, kadar air 39,53 %, kohesi 25,725 kPa dan sudut geser dalam 26,28^{o}. Nilai faktor keamanan lereng A tergolong stabil untuk lereng keseluruhan yaitu sebesar 1,471 tanpa beban, 1,395 dengan beban *dump truck* muatan kosong dan 1,188 beban *truck* muatan penuh. Sedangkan Lereng B tergolong stabil dengan nilai faktor keamanan yaitu sebesar 1,342 tanpa beban, 1,261 dengan beban *dump truck* muatan kosong dan 1,062 beban *truck* muatan penuh. Arahan Pengelolaan dilakukan melalui geometri lereng dengan pemotongan pada lereng A yang dibuang sebanyak 1638,36 m^3 dan B sebanyak 1870,16 m^3, pembuatan saluran drainase u memiliki kedalaman (H) 0,525 m, lebar dasar saluran (b) 0,187 m, lebar saluran permukaan atas saluran (B) 1,027 m., serta pendekatan institusi sebagai wujud pelaksanaan dari regulasi.

Kata Kunci : Pertambangan, Kestabilan Lereng, Faktor Keamanan, Metode Janbu yang disederhanakan, *Rocscience Slide,* Arahan Pengelolaan

Slope Management Guidelines for Pit Gajah Based on Slope Stability at PT. X, Segah District, Berau Regency, East Kalimantan

Ilmam Farizi
114210075

ABSTRACT

PT. X operates in the coal mining sector. The company focuses on the exploration, extraction, and distribution of coal. PT. X utilizes an open-pit mining system, which results in land alteration and the formation of slopes. At Pit Gajah, certain slopes exhibit steep geometrical configurations. In addition, the physical and mechanical properties of the soil, which constitute the slope materials, are significantly influenced by high rainfall, further affecting slope stability. Slope stability requires special attention, particularly in mining areas and active pits, as instability can disrupt operations and pose serious safety risks. This study aims to assess the slope conditions based on the physical and mechanical properties of the soil and to determine the slope safety factor, which serves as a reference for providing appropriate slope management recommendations.

This research employs both quantitative and qualitative analysis methods, based on data collected from field surveys, mapping, and laboratory testing. Soil sampling was conducted using a purposive sampling technique, wherein undisturbed soil samples were collected according to ASTM D-1587 standards for the purpose of testing soil unit weight, moisture content, internal friction angle, and permeability. Meanwhile, disturbed soil samples were used to analyze the physical characteristics of the soil, including grain size distribution, liquid limit, plasticity index, and porosity. The slope safety factor was determined through slope stability analysis using the simplified Janbu method, assisted by Rocscience Slide software. The results of the analysis were then evaluated descriptively by referring to the Safety Factor classification according to Bowles (1989) and the Guidelines for the Implementation of Good Mining Engineering Practices as stipulated in the Decree of the Minister of Energy and Mineral Resources No. 1827 K/30/MEM/2018.

Based on the physical and mechanical properties of the soil, Slope A exhibited a unit weight of 17.763 N/cm³, moisture content of 26.143%, cohesion of 26.894 kPa, and an internal friction angle of 29.05°. In contrast, Slope B demonstrated a unit weight of 17.329 N/cm³, moisture content of 39.53%, cohesion of 25.725 kPa, and an internal friction angle of 26.28°. The safety factor for Slope A is classified as stable for overall slope conditions, with values of 1.471 under no load, 1.395 under the load of an empty dump truck, and 1.188 under the load of a fully loaded truck. Similarly, Slope B is considered stable, with safety factor values of 1.342 under no load, 1.261 under the load of an empty dump truck, and 1.062 under the load of a fully loaded truck. Management directives are carried out through slope geometry, involving slope cutting on Slope A amounting to 1,638.36 m³ and on Slope B amounting to 1,870.16 m³. Additionally, the construction of a U-shaped drainage channel is implemented, with a depth (H) of 0.525 m, a base width (b) of 0.187 m, and a surface width (B) of 1.027 m. Furthermore, an institutional approach is applied as a means of implementing the relevant regulations.

Keywords: Mining, Slope Stability, Safety Factor, Simplified Janbu Method, Rocscience Slide, Slope Management