ABSTRAK

GEOLOGI DAN ANALISIS KESTABILAN LERENG UNTUK EVALUASI GEOMETRI LERENG PADA TAMBANG TERBUKA BATUBARA, DESA TEGALREJO DAN SEKITARNYA, KABUPATEN MUARA ENIM, PROVINSI SUMATERA SELATAN

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Daerah penelitian berada di Desa Tegalrejo dan sekitarnya, Kabupaten Muara Enim, Provinsi Sumatera Selatan, pada wilayah operasional PT Bukit Asam Tbk. Kegiatan penambangan dengan metode tambang terbuka memiliki potensi terjadinya ketidakstabilan lereng yang dapat mengganggu produksi serta membahayakan keselamatan kerja. Oleh karena itu, penelitian ini dilakukan untuk mengkaji kondisi geologi dan mengevaluasi kestabilan lereng guna memperoleh rekomendasi geometri lereng yang aman dan optimal. Metode penelitian meliputi pemetaan geologi lapangan sebagai data primer serta penggunaan data sekunder perusahaan berupa topografi, Digital Elevation Model (DEM), dan material properties. Klasifikasi massa batuan dilakukan menggunakan metode scanline dengan pembobotan Geological Strength Index (GSI), Rock Mass Rating (RMR), dan Slope Mass Rating (SMR). Analisis kestabilan lereng dilakukan menggunakan metode keseimbangan batas Morgenstern-Price pada tiga penampang, yaitu sidewall timur (A–A'), sidewall tenggara (B–B'), dan lowwall (C–C') dalam kondisi jenuh dan dinamis. Daerah penelitian tersusun oleh Satuan Batulempung Muara Enim, Satuan Batupasir Muara Enim, dan material disposal berumur Holosen. Klasifikasi massa batuan menunjukkan kualitas poor–fair (RMR) dan bad–normal (SMR). Analisis kestabilan lereng menunjukkan sidewall tenggara dan lowwall dalam kondisi stabil, sedangkan sidewall timur tergolong kritis. Setelah dilakukan evaluasi geometri, nilai FK sidewall timur meningkat menjadi > 1,262 sehingga lereng menjadi stabil.

Kata kunci: batubara, faktor keamanan, klasifikasi massa batuan, kestabilan lereng, Morgenstern-Price, scanline.

ABSTRACT

GEOLOGY AND SLOPE STABILITY ANALYSIS FOR THE EVALUATION OF SLOPE GEOMETRY IN AN OPEN-PIT COAL MINE, TEGALREJO VILLAGE AND SURROUNDING AREAS, MUARA ENIM REGENCY, SOUTH SUMATRA PROVINCE

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The study area is located in Tegalrejo Village and surrounding areas, Muara Enim Regency, South Sumatra Province, within the mining concession of PT Bukit Asam Tbk. Open-pit mining activities have the potential to cause slope instability, which may disrupt production and pose risks to occupational safety. Therefore, this study was conducted to investigate the geological conditions and evaluate slope stability in order to obtain safe and optimal slope geometry recommendations. The research methods included geological field mapping as primary data collection and the utilization of secondary data provided by the company, including topographic maps, Digital Elevation Model (DEM) data, and material properties. Rock mass classification was carried out using the scanline method with Geological Strength Index (GSI), Rock Mass Rating (RMR), and Slope Mass Rating (SMR) assessments. Slope stability analysis was performed using the Morgenstern–Price limit equilibrium method on three cross-sections, namely the eastern sidewall (A–A'), southeastern sidewall (B–B'), and lowwall (C–C'), under saturated and dynamic conditions. The study area is composed of the Muara Enim Claystone Unit, Muara Enim Sandstone Unit, and Holocene-aged disposal material. Rock mass classification results indicate poor to fair quality based on RMR and bad to normal quality based on SMR. The slope stability analysis shows that the southeastern sidewall and lowwall are stable, whereas the eastern sidewall is classified as critical. After slope geometry optimization, the Factor of Safety (FoS) of the eastern sidewall increased to 1.262, indicating stable slope conditions.

Keywords: *coal, factor of safety, Morgenstern-Price, rock mass classification, scanline, slope stability*