UNIVERSITAS
GADJAH MADA
**Evaluasi Kestabilan Lereng di Blok "A-G" Pit "REY" Tambang Senakin, Cekungan Asem-Asem, Provinsi
Kalimantan Selatan**
Riza Edria Yogantara, Ir. I Gde Budi Indrawan, S.T., M.Eng, Ph.D., IPM.; Ir. Rahmadi Hidayat, S.T., M.Eng., Ph.D., IP
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

Penelitian ini dilakukan pada lereng *highwall* Blok "A–F" serta *highwall* dan *sidewall* Blok "G" Pit "REY", Tambang Senakin PT Arutmin Indonesia, Kalimantan Selatan. Penelitian ini bertujuan mengevaluasi kondisi geologi teknik, kualitas massa batuan, potensi keruntuhan, tingkat kestabilan lereng, serta menyusun rekomendasi geometri lereng berdasarkan metode *Rock Mass Rating* (RMR), *Slope Mass Rating* (SMR), dan *Limit Equilibrium Method* (LEM). Penelitian dilakukan melalui pemetaan geologi teknik, pengukuran struktur geologi dengan metode *scanline*, pengujian *point load test*, analisis RMR, SMR, analisis kinematika, dan analisis kesetimbangan batas menggunakan metode *Morgenstern–Price* dengan pendekatan *Mohr–Coulomb* dan *Generalised Hoek–Brown*. Daerah penelitian merupakan lereng tambang dengan morfologi *mine pit* yang memiliki kemiringan lereng datar hingga curam ekstrem dan tersusun oleh batulempung (*claystone*), batulanau (*medium siltstone* dan *coarse siltstone*), batupasir kuarsa (*medium sandstone*), batubara (*coal*), serta material timbunan (*waste material*) di atas material *in-situ* yang termasuk Formasi Tanjung berumur Eosen. Hasil penelitian menunjukkan kualitas massa batuan berdasarkan klasifikasi RMR berada pada kelas *fair rock* hingga *poor rock*, sedangkan nilai GSI berkisar 50–80. Secara vertikal kualitas massa batuan cenderung meningkat pada elevasi yang lebih tinggi, sedangkan secara horizontal menurun ke arah selatan akibat pengaruh kondisi air tanah dan perkembangan bidang diskontinuitas. Analisis SMR menunjukkan lereng berada pada kelas III (*partially stable*) hingga kelas V (*completely unstable*) dengan potensi keruntuhan dominan berupa *plane failure* dan *wedge failure*. Analisis LEM menunjukkan pendekatan *Generalised Hoek–Brown* menghasilkan faktor keamanan lebih rendah dibandingkan *Mohr–Coulomb* sehingga lebih merepresentasikan kondisi massa batuan aktual. Rekayasa geometri melalui pelebaran *bench* pada zona kritis meningkatkan faktor keamanan menjadi 1,718 pada sayatan AA' dan 1,310 pada sayatan BB', sehingga memenuhi kriteria KEPMEN ESDM RI No. 1827 K/30/MEM/2018.

Kata Kunci: Kestabilan Lereng, *Rock Mass Rating* (RMR), *Slope Mass Rating* (SMR), *Limit Equilibrium Method* (LEM), *Pit* "REY"

UNIVERSITAS
GADJAH MADA
**Evaluasi Kestabilan Lereng di Blok "A-G" Pit "REY" Tambang Senakin, Cekungan Asem-Asem, Provinsi
Kalimantan Selatan**
Riza Edria Yogantara, Ir. I Gde Budi Indrawan, S.T., M.Eng, Ph.D., IPM.; Ir. Rahmadi Hidayat, S.T., M.Eng., Ph.D., IP
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

ABSTRACT

This study was conducted on the highwall slopes of Block "A–F" and the highwall and sidewall slopes of Block "G" in Pit "REY", Senakin Mine, PT Arutmin Indonesia, South Kalimantan. The objectives of this study were to evaluate the engineering geological conditions, rock mass quality, potential slope failure mechanisms, slope stability, and to propose an appropriate slope geometry design based on the Rock Mass Rating (RMR), Slope Mass Rating (SMR), and Limit Equilibrium Method (LEM). The research methods included engineering geological mapping, geological structure measurements using the scanline method, point load testing, rock mass quality assessment based on the RMR classification, slope failure potential analysis using SMR and kinematic analysis, and slope stability analysis using the Morgenstern–Price method with the Mohr–Coulomb and Generalized Hoek–Brown failure criteria. The study area consists of an open-pit mining slope with gentle to extremely steep slope gradients and is composed of claystone, medium siltstone, coarse siltstone, medium sandstone, coal, and waste material overlying in-situ rock units of the Eocene Tanjung Formation. The results indicate that the rock mass quality based on the RMR classification ranges from fair rock to poor rock, while the Geological Strength Index (GSI) values range from 50 to 80. Vertically, the rock mass quality generally improves toward higher elevations, whereas horizontally it decreases toward the southern part of the study area due to groundwater conditions and the development of discontinuities. The SMR analysis classifies the slopes as Class III (partially stable) to Class V (completely unstable), with plane failure and wedge failure identified as the dominant potential failure mechanisms. The LEM analysis indicates that the Generalized Hoek–Brown approach produces lower factors of safety than the Mohr–Coulomb approach, suggesting that it better represents the actual rock mass conditions in the field. Based on these findings, slope geometry was redesigned through bench widening in critical zones, increasing the factors of safety to 1.718 for Section AA' and 1.310 for Section BB' under static conditions, thereby satisfying the stability criteria specified in the Decree of the Minister of Energy and Mineral Resources of the Republic of Indonesia No. 1827 K/30/MEM/2018.

Keyword**:** *Slope Stability, Rock Mass Rating (RMR), Slope Mass Rating (SMR), Limit Equilibrium Method (LEM), Pit* "REY"