INTISARI

Berdasarkan data Kementerian ESDM 2021, Sumatera adalah daerah dengan potensi sumber daya batubara dan cadangan terbesar di Indonesia, yaitu mencapai 38,3 persen. Pemanfaatan potensi sumber daya batubara dilakukan dengan kegiatan pertambangan batubara. Studi kelayakan menjadi salah satu tahapan dalam kegiatan pertambangan batubara, dinalisis geoteknik mengenai kestabilan lereng termasuk dalam salah satu hal penting yang perlu diperhatikan. Penelitian ini diharapkan dapat memberikan evaluasi keamanan desain lereng *Level of Mine* (LOM) yang dimiliki perusahaan, memberikan referensi mengenai rekomendasi desain lereng aman bagi perusahaan pemilik Izin Usaha Pertambangan (IUP) di lokasi tambang terbuka batubara Lahat sesuai dengan KEPMEN 1827 K/30/MEM/2018 dan SNI 8460:2017, dan memberikan referensi mengenai analisis kestabilan lereng tambang terbuka bagi pengembangan bidang keilmuan geoteknik dan aplikasi untuk pertambangan.

Penelitian ini dilakukan di lokasi Izin Usaha Pertambangan (IUP) tambang terbuka batubara Desa Kebur, Kecamatan Merapi Barat, Kabupaten Lahat, Provinsi Sumatera Selatan. Prosedur penelitian dengan melakukan pengumpulan data sekunder sebagai dasar analisis, baik berupa data geologi, hidrogeologi, maupun geoteknik. Analisis klasifikasi massa batuan ada tiga, yaitu *Rock Quality Designation* (RQD) mengacu Deere & Deere (1989), *Rock Mass Rating* (RMR) mengacu Bieniawski (1989), dan *Geological Strength Index* (GSI) mengacu Marinos, dkk (2007). Kriteria keruntuhan *Generalized Hoek-Brown* digunakan dalam analisis kestabilan lereng untuk material batuan dan *Mohr-Coulomb* untuk material *soil*, dengan bantuan *software SLIDE* untuk metode kesetimbangan batas dan *software RS2* untuk metode elemen hingga, serta *Dips7* untuk metode kinematik.

Hasil klasifikasi massa batuan menggunakan klasifikasi *RMR* dianggap paling representatif, karena mencakup parameter *RQD* dan *GSI* yang berupa *surface condition* dan *structure class* di dalamnya. Urutan kelas massa batuan berdasarkan nilai *RMR* dari area yang paling baik secara berurutan adalah area PIT-4, PIT-2. PIT-1, PIT-5, dan PIT-3. Rekomendasi lereng aman yang digunakan sesuai KEPMEN 1827 K/30/MEM/2018 dan SNI 8460:2017 adalah area *PIT*-2 dan *PIT*-4 menggunakan desain lereng asli, area *PIT*-1 menggunakan desain sudut lereng 55º, area *PIT*-3 dan *PIT*-5 menggunakan desain sudut lereng 50º. Perlapisan material batubara yang memiliki sifat *brittle* cenderung memiliki indikasi sebagai bidang lemah lereng di setiap area, sesuai dengan analisis menggunakan

metode elemen hingga. Analisis kinematik di area *PIT*-3 dan *PIT*-4 tidak berpotensi mengalami keruntuhan dengan mekanisme *toppling failure*, sedangkan di area *PIT*-5 tidak berpotensi mengalami keruntuhan mekanisme *plane failure*.

Kata kunci: tambang terbuka batubara, klasifikasi massa batuan, kestabilan lereng batuan, metode kesetimbangan batas, metode elemen hingga.

ABSTRACT

Based on data from the Ministry of Energy and Mineral Resources in 2021, Sumatra is an area with the largest potential for coal resources and reserves in Indonesia, reaching 38.3 percent. Utilization of potential coal resources is carried out by coal mining activities. Feasibility studies are one of the stages in coal mining activities, geotechnical analysis of slope stability is one of the important things that need attention. This study is expected to provide an evaluation of the safety of the Level of Mine (LOM) slope design owned by the company, provide a reference on safe slope design recommendations for companies holding Mining Business License (IUP) at the Lahat open-pit coal mine in accordance with KEPMEN 1827 K/30/MEM/2018 and SNI 8460:2017, and provides a reference on the analysis of slope stability of open pit mines for the development of geotechnical science and applications for mining.

This research was conducted at the location of an open-pit coal mine Mining Business License (IUP) in Kebur Village, West Merapi District, Lahat Regency, South Sumatra. The research procedure is to collect secondary data as a basis for analysis, both in the form of geological, hydrogeological, and geotechnical data. There are three rock mass classification analysis, namely Rock Quality Designation (RQD) referring to Deere & Deere (1989), Rock Mass Rating (RMR) referring to Bieniawski (1989), and Geological Strength Index (GSI) referring to Marinos, et al (2007). The generalized Hoek-Brown failure criteria are used in the analysis of slope stability for rock materials and Mohr-Coulomb for soil materials, with the help of SLIDE software for the boundary equilibrium method and RS2 software for the finite element method, and Dips7 for the kinematic method.

The results of rock mass classification using the RMR classification are considered the most representative, because they include RQD and GSI parameters in the form of surface conditions and structure class in them. The order of rock mass classes based on the RMR value of the best area, respectively, is the PIT-4, PIT-2 area. PIT-1, PIT-5, and PIT-3. Safe slope recommendations used according to KEPMEN 1827 K/30/MEM/2018 and SNI 8460:2017 are the PIT-2 and PIT-4 areas using the original slope design, the PIT-1 area using the 55º slope angle design, the PIT-3 and PIT areas -5 uses a 50º slope angle design.

Coal material layers that have brittle properties tend to have indications as weak slope areas in each area, according to the analysis using the finite element method. The kinematic analysis in the PIT-3 and PIT-4 areas does not have the potential to collapse with the toppling failure mechanism, while in the PIT-5 area there is no potential for the plane failure mechanism to collapse.

Keywords: open-pit coal mine, rock mass classification, rock slope stability, limit equilibrium method, finite element method