

## RINGKASAN

PT. Pesona Khatulistiwa Nusantara (PT. PKN) merupakan perusahaan pertambangan batubara yang beroperasi di Kabupaten Bulungan, Provinsi Kalimantan Utara. Kegiatan penambangan tambang terbuka PT. PKN akan menghasilkan lereng berjenjang *highwall* dan *lowwall* hingga lapisan batubara terakhir pada sayatan penampang.

Lereng penambangan akan berpotensi longsor apabila geometri lereng yang digunakan tidak sesuai dengan karakteristik massa batuan di dinding lubang bukaan, sehingga diperlukan perancangan geometri lereng pendahuluan yang aman dan stabil sesuai karakteristik massa batuan, jenis potensi longsor dan kondisi geologi setempat.

Lokasi penelitian berada pada *site* Rangau dengan penampang sayatan M-M' yang ditargetkan hingga kedalaman 192 meter untuk *highwall*, dan kedalaman 204 meter untuk *lowwall*. Perhitungan Faktor Keamanan menggunakan metode kesetimbangan batas (*limit equilibrium method*), pada dinding *highwall* yang berpotensi longsor busur (*circular failure*) menggunakan metode Bishop, sedangkan dinding *lowwall* yang berpotensi longsor bidang (*non-circular failure*) menggunakan metode Morgenstren-Price, Analisis Probabilistik (*probabilistic of failure*) serta dengan pendekatan perhitungan kriteria keruntuhan Mohr-Coulomb. Permodelan dilakukan dengan pendekatan sifat fisik dan mekanik batuan hasil uji laboratorium. Analisis lereng tunggal menggunakan variasi kemiringan 50°, 60°, 70° dengan kondisi lereng kering dan jenuh. Analisis lereng keseluruhan menggunakan variasi lebar *bench* dengan kondisi Muka Air Tanah (MAT) kering, 8H, 4H, 2H dan jenuh menurut Hoek and Bray (1981), faktor seismik bernilai 0,05g dengan asumsi beban alat mekanis diabaikan. Lereng tunggal dianggap stabil jika Faktor Keamanan (FK)  $\geq 1,1$ , dan lereng keseluruhan stabil apabila FK  $\geq 1,2$  (sesuai dengan Keputusan Menteri Energi dan Sumber Daya Mineral Republik Indonesia No. 1827 K/30/MEM/2018).

Berdasarkan hasil analisis menggunakan metode kesetimbangan batas dengan program Slide Rocscience v.6.0 diperoleh lereng tunggal yang dapat diaplikasikan dengan tinggi 12 meter dan sudut kurang dari 70°, untuk lereng keseluruhan *highwall* sayatan M-M' ketinggian 192 meter dengan sudut lereng kurang dari 37° dan lebar *bench* 6 meter dalam kondisi lereng agak jenuh (2H), untuk lereng *lowwall* ketinggian 204 meter dengan sudut lereng kurang dari 37° dan lebar *bench* 6 meter dalam kondisi agak jenuh (2H). Analisis menghasilkan lereng optimum untuk *highwall* dalam kondisi lereng agak jenuh (2H) dan *lowwall* dalam kondisi agak jenuh (2H) sehingga analisis area pengaruh MAT diperlukan untuk mengontrol kestabilan akibat pengaruh MAT berupa pemasangan *standpipe piezometer* dan kegiatan drainase serta penyaliran.

## ***ABSTRACT***

PT. Pesona Khatulistiwa Nusantara (PT PKN) is a coal mining company operating at Bulungan District, North Kalimantan Province. Mining activities of PT. PKN will make slopes until the last coal seam in cross section.

Mining slopes will have potential failure if the slope geometry is not suitable with the rock mass characteristics, so it is necessary to design a safe and stable preliminary geometry based on rock mass characteristics, potential failure types and local geological conditions.

The location of the research was carried out on the Ranagu site with cross section M-M' targeted to a depth of 192 meters for highwall, and depth of 204 meters for lowwall. Safety factor calculations use the limit equilibrium method, on highwall which has the potential for circular failure using the Bishop Method while lowwall which has the potential of non-circular failure using the Morgenstren-Price method, Probabilistic Analysis and the approach to calculating Mohr-Coulomb's failure criteria. Modeling is done by approaching the physical and mechanical properties of rock from laboratory test results. Single slope analysis uses a slope variation of 50°, 60°, 70° with dry and saturated slope conditions. Overall slope analysis uses variations in bench width with ground water level conditions dry, 8H, 4H, 2H and saturated according to Hoek and Bray, (1981), seismic factors are valued at 0,05g and assuming the burden of mechanical devices is ignored. The single slope is considered stable if the Safety Factor (FK)  $\geq 1,1$  and the overall slope is stable if  $FK \geq 1,2$  (according to the Decree of the Minister of Energy and Mineral Resources of the Republic of Indonesia No. 1827 K / 30 / MEM / 2018).

Based on the analysis using the limit equilibrium methods with Rocscience Slide v.6.0 program, a single slope that can be applied with a height of 12 meters and an angle less than 70°, for the overall slope of the highwall M-M' height 192 meters with a slope angle less than 37° and bench width 6 meters in a slightly saturated slope conditions (2H), for the lowwall slopes 204 meters with a slope angle less than 37° and bench width 6 meters in a slightly saturated slope conditions (2H). The analysis produced the optimum slope for highwall in a slightly saturated slope condition (2H) and for lowwall in a slightly saturated (2H) so that the analysis of the MAT influence area was needed to control the stability of the slope due to the influence of the ground water level in the form of a piezometer standpipe and drainage activities.