

ABSTRAK

KAJIAN TEKNIS SISTEM PENYALIRAN TAMBANG *FRONT* “MYANMAR” UNIT BISNIS PERTAMBANGAN BAUKSIT PT ANTAM TBK

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Sistem penyaliran tambang memegang peranan penting dalam menjamin kelancaran dan keselamatan kegiatan penambangan. Genangan air yang tidak terkendali pada area kerja penambangan dapat menghambat aktivitas operasional serta meningkatkan risiko teknis dan lingkungan. Lokasi penelitian berada di *front* “Myanmar” Unit Bisnis Pertambangan Bauksit (UBPB) PT Aneka Tambang Tbk, Kecamatan Tayan Hilir, Kalimantan Barat, yang memiliki karakteristik curah hujan tinggi dan sistem penyaliran eksisting yang belum dikaji secara menyeluruh. Penelitian ini bertujuan untuk menganalisis kondisi hidrologi dan mengevaluasi sistem penyaliran tambang, meliputi saluran terbuka dan kolam pengendapan lumpur, guna memperoleh rancangan sistem penyaliran yang optimal.

Analisis hidrologi dilakukan menggunakan data curah hujan harian maksimum selama 10 tahun (2015–2024). Penentuan curah hujan rencana dilakukan dengan analisis distribusi frekuensi menggunakan metode Gumbel, Log Normal, dan Log Pearson Tipe III yang diuji dengan metode Chi-Square dan Smirnov–Kolmogorov. Intensitas curah hujan dihitung menggunakan metode Mononobe, sedangkan debit limpasan ditentukan dengan metode Rasional. Perancangan saluran terbuka dilakukan menggunakan pendekatan *Trial and Error* berdasarkan persamaan Manning, serta divalidasi melalui pemodelan hidraulika menggunakan perangkat lunak HEC-RAS. Evaluasi kolam pengendapan dilakukan berdasarkan analisis kecepatan pengendapan, *overflow rate*, dan efisiensi pengendapan partikel.

Berdasarkan hasil perhitungan, distribusi Gumbel terpilih dengan curah hujan rencana 122,70 mm/hari dengan intensitas 40,6 mm/jam. Debit air limpasan maksimum sebesar 0,313 m³/detik. Berdasarkan hasil simulasi menggunakan perangkat lunak HEC-RAS menyatakan dua saluran terbuka mampu mengalirkan air limpasan. Namun, evaluasi kinerja kolam pengendapan berdasarkan *overflow rate*, kecepatan pengendapan, dan efisiensi pengendapan, kolam pengendapan dinyatakan belum mampu menurunkan konsentrasi padatan secara signifikan. Oleh karena itu, diperlukan modifikasi desain kolam dengan memperpanjang lintasan aliran (panjang efektif) untuk meningkatkan efisiensi kolam pengendapan

Kata kunci: Curah hujan, Debit Limpasan, Sistem Penyaliran Tambang

ABSTRACT

TECHNICAL STUDY OF MINE DRAINAGE SYSTEM AT “MYANMAR” FRONT BAUXITE MINING BUSINESS UNIT OF PT ANTAM Tbk

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Mine drainage systems play an important role in ensuring the continuity and safety of mining operations. Uncontrolled water accumulation at the mining front can disrupt operational activities and increase technical as well as environmental risks. This study was conducted at the “Myanmar” Front of the Bauxite Mining Business Unit of PT ANTAM Tbk, Tayan Hilir District, West Kalimantan, which is characterized by high rainfall intensity and an existing drainage system that has not yet been comprehensively evaluated. The objective of this study is to analyze hydrological conditions and evaluate the mine drainage system, including open channels and sedimentation ponds, in order to obtain an optimal drainage system.

Hydrological analysis was carried out using 10 years of maximum daily rainfall data (2015–2024). The determination of design rainfall was performed through frequency distribution analysis using the Gumbel, Log Normal, and Log Pearson Type III methods, which were tested using the Chi-Square and Smirnov–Kolmogorov test. Rainfall intensity was calculated using the Mononobe method, while surface runoff discharge was determined using the Rational method. The design of open channels was conducted using the Trial and Error approach based on Manning’s equation and validated through hydraulic modeling using HEC-RAS software. The performance of the sedimentation pond was evaluated based on particle settling velocity, surface overflow rate, and sedimentation efficiency.

The results indicate that the Gumbel distribution was selected as the most appropriate distribution, producing a design rainfall of 122.70 mm/day with a rainfall intensity of 40,6 mm/hour. The maximum runoff discharge was calculated to be 0.313 m³/s. Hydraulic simulation using HEC-RAS shows that the two designed open channels are capable of conveying the design runoff discharge. However, the evaluation of the sedimentation pond based on settling velocity, overflow rate, and sedimentation efficiency indicates that the existing pond is not yet able to sufficiently reduce suspended sediment concentrations. Therefore, modifications to the sedimentation pond design, particularly by extending the flow path length, are required to improve sedimentation efficiency.

Keywords: Rainfall, Runoff Discharge, Mine Drainage System