RINGKASAN

PT. Djava Berkah Mineral (PT. DBM) merupakan perusahaan yang bergerak di bidang kontraktor pertambangan dengan komoditas utama Nikel laterit yang terletak di Kecamatan Petasia Timur, Kabupaten Morowali Utara, Provinsi Sulawesi Tengah. *Jobsite* penelitian ini milik PT. Bukit Makmur Istindo Nikeltama dengan luas IUP 4778 Ha. Pada pertengahan tahun 2021 PT. DBM dan PT. Bumanik akan memulai penambangan dengan rata-rata target produksi 60.000 ton/bulan selama 7 bulan di *Pit C* Blok Keuno, sehingga dibutuhkan optimasi tambang terbuka dan perencanaan tambang untuk mencapai target produksi yang ditentukan oleh perusahaan.

Tujuan penelitian ini adalah melakukan optimasi tambang terbuka sehingga diperoleh rekomendasi *pit shell*. *Pit shell* optimal digunakan sebagai acuan rencana dan rancangan penambangan. Setelah melakukan optimasi lalu membandingkan rencana penambangan sebelum dan sesudah optimasi. Kemajuan penambangan dibuat selama 7 bulan dengan target produksi 60.000 ton/bulan.

Metode optimasi yang digunakan dalam penelitian ini yaitu Lerch-Grosmann. Algoritma Lerch-Grossman diciptakan oleh Lerch dan Grossman pada tahun 1965. Algoritma ini digunakan untuk mengoptimasi lubang bukaan tambang berdasarkan pendekatan matematis metode numerik. Ada dua macam algoritma yang dikembangkan, yaitu algoritma pemrograman dinamis sederhana untuk lubang bukaan tambang dua dimensi (satu bagian vertikal tambang) dan algoritma grafik yang lebih rumit untuk lubang bukaan tambang tiga dimensi.

Pit shell 3 merupakan *pitshell* optimal dengan NPV $2.097.865, IRR (*Internal Rate Return)* 49%. Rancangan penambangan dari acuan *pit shell* ketiga menghasilkan nilai NPV sebesar $2.016.865, IRR 47%, dan PBP (*Pay Back Period*) 4 bulan. Hasil cadangan berdasarkan rancangan penambangan didapatkan bijih Nikel sebesar 439.000 ton dan batuan sisa sebesar 829.000 ton dengan *stripping ratio* 1,89 yang akan dibagi menjadi 7 bulan. Alat muat yang digunakan pada pengupasan lapisan tanah penutup adalah *Excavator* Komatsu PC300 dan alat angkut *Mercedez Benz Axor 2528C* sedangkan pengupasan bijih Nikel menggunakan alat muat *Excavator* Komatsu PC 300 dan alat angkut *UD QUESTER CWE 370*. Hasil rencana penambangan sebelum optimasi tambang terbuka NPV $1.423.998, IRR 43%, dan PBP 4 bulan.

Berdasarkan analisis *pit shell* yang dipilih adalah skema *specified case* dengan parameter NPV tertinggi. *Pit shell* 3 yang paling optimal menjadi acuan dalam rancangan penambangan. Berdasarkan hasil di atas, membuktikan bahwa proses optimasi menghasilkan nilai keuntungan yang lebih besar. Proses optimasi perlu dilakukan sebelum perencanaan dan perancangan penambangan untuk memperoleh keuntungan yang optimal.

SUMMARY

PT. Djava Berkah Mineral (PT. DBM) is a mining contractor company with the main commodity of Nickel laterite, which is located in East Petasia District, North Morowali Regency, Central Sulawesi Province. This research jobsite was owned by PT. Bukit Makmur Istindo Nickeltama with an IUP area of 4778 Ha. In mid-2021 PT. DBM and PT. Bumanik has started mining with an average production target of 60.000 tons/month for 7 months at Pit C Keuno Block, as of open pit optimization and mine planning was required an open pit optimization and mine planning to achieve the production target set by the company.

Optimizing open pit mines was the purpose of this research so the pit shell recommendations were obtained. The optimal pit shell were used as a reference for mining plans and designs. After doing the optimization and then comparing the mining plan before and after optimization. Mining progress was made for 7 months with a production target of 60.000 tons/month.

Lerch-Grossman was an optimization method used in this research. The Lerch-Grossman algorithm was created by Lerch and Grossmann in 1965. This algorithm was used to optimize mine pits based on a mathematical approach to numerical methods. There were two kinds of algorithms developed, videlicet a simple dynamic programming algorithm for a two-dimensional mine opening (one vertical part of the mine) and a more complex graphic algorithm for a three-dimensional mine opening.

Pit shell 3 was the optimal pit shell with NPV (Net Present Value) $2.097.865, IRR (Internal Rate Return) 49%. The NPV value of $2.016.865, IRR 47%, and PBP (Pay Back Period) 4 months was generated by the mining design of the third pit shell reference. The results of the reserves was based on the mining design obtained Nickel ore of 439.000 tons and waste rock of 829.000 tons with a stripping ratio of 1,89 which were divided into 7 months. The Komatsu PC300 Excavator and the Mercedez Benz Axor 2528C haul truck were used as the loading equipment for overburden removal, while the Komatsu PC 300 excavator and the UD QUESTER CWE 370 haul truck were used for stripping Nickel ore. NPV $1,423,998, IRR 43% and PBP 4 months were the result of mining plan prior to optimization of open pit mine.

The specified case scheme with the highest NPV parameter was the scheme that has been selected based on pit shell analysis. Pit shell 3 has became the most optimal reference in mining design. Based on the results above, it has proved, that a greater profit value has been generated by the optimization process. In order to obtain optimal profit, optimization process was required prior to mining planning and design.