

RINGKASAN

Kegiatan pertambangan bauksit yang dilakukan PT. HPAM menghasilkan residu pencucian bauksit di lokasi *Bauxite Processing Plant* (BPP) 4-5. Keterbatasan lahan sebagai akses pemanfaatan ruang bersama dengan sektor *non* pertambangan berpotensi menimbulkan permasalahan dalam penempatan residu yang dihasilkan dari sejumlah cadangan yang direncanakan. Pemikiran hipotetik yang ada bahwa optimasi kapasitas residu dipengaruhi oleh geometri tumpukan, laju produksi dan komposisi residu yang dihasilkan, sehingga laju produksi berjalan berkorelasi positif terhadap jumlah residu yang dihasilkan dan berkorelasi negatif terhadap daya tampung. Untuk itu diperlukan adanya kajian optimasi daya tampung residu padatan bauksit yang dihasilkan dari proses pencucian, untuk dapat memprediktif jumlah, kebutuhan daya tampung serta komposisi residu secara optimal.

Kajian optimasi daya tampung area residu padatan bauksit dilakukan dengan menghitung kapasitas tumpukan, menganalisa jumlah produksi dan residu yang dihasilkan serta menganalisis prediktif residu berdasarkan historikal data yang diperoleh dalam kurun waktu 1 tahun. Analisis prediktif dilakukan dengan metode regresi-korelasi atas fenomena sebaran data linier sederhana, berganda serta non linier polinomial sebagai pembanding perolehan *overfitting* terbaik. Penentuan jumlah komposisi optimum residu atas klasifikasi ukuran produk residu (*cobble-boulder* dan *non cobble-boulder*) menggunakan salah satu teknik *research operations* yaitu metode *simplex (linier programming)* berdasar komposisi % *solid* dan % *liquid* yang terkandung dalam residu.

Hasil perhitungan memaparkan geometri residu 1 dan 2 BPP 4-5 mampu menampung residu sebanyak $1.529.517 \text{ m}^3$ ($\approx 2.447.226,8 \text{ Ton}$) atau hanya dapat menampung jumlah produksi tambang (*raw bauxite*) sebesar $5.497.213 \text{ Ton}$ atau produksi pencucian bauksit (*washed bauxite*) sebesar $3.061.310 \text{ Ton}$. Sisa daya tampung residu 1 saat ini sebesar 65.015 m^3 ($\approx 104.025 \text{ Ton}$) atau masih bisa menampung residu atas produksi *raw bauxite* sebanyak 233.629 Ton atau produksi *washed bauxite* sebanyak 130.104 Ton . Jika berdasarkan data jumlah cadangan tertambang $9.672.566 \text{ Ton}$ dan cadangan tercuci *washed bauxite* $5.386.498 \text{ Ton}$ yang direncanakan PT. HPAM, maka diprediksi terjadi kekurangan daya tampung residu sebesar $1.148.389,319 \text{ m}^3$ (dari $1.529.517 \text{ m}^3$) dengan lama periode produksi (umur tampung residu) adalah $1.300,605 \text{ Hari Kerja} \approx 3,563 \text{ Tahun}$ (asumsi 1 tahun 365 Hari Kerja) dan komposisi optimal residu terdiri atas *cobble-boulder* $5,2\%$ dan *non cobble-boulder* $94,8\%$.

ABSTRACT

Bauxite mining activities conducted by PT. HPAM produces bauxite washing residue at the Bauxite Processing Plant (BPP) 4-5. Limitations of land as access to space utilization along with the non-mining sector have the potential to cause problems in the placement of residues resulting from a number of planned reserves. Existing hypothetical that the optimization of residual capacity is affected by the geometry of the pile, the rate of production and the resulting residual composition, so that the production rate runs is positively correlated with the amount of residue produced and negatively correlated to the shelf capacity. Therefore, it is necessary to study the optimization of residual capacity of bauxite solid residue resulting from washing process, to be able to predict the amount, capacity requirement and residue composition optimally.

The optimum study of the capacity of the bauxite solid residue area is done by calculating the capacity of the pile, analyzing the amount of production and residue produced and analyzing the residual predictive based on historical data obtained within 1 year. Predictive analysis was performed by regression-correlation method on the phenomenon of simple, multiple, and non-linear polynomial data distribution as a comparison of the best overfitting curve. Determination of amount of residual optimum composition of cobble-boulder and non cobble-boulder classification using one of research operations technique is simplex method (linear programming) based on solid (%) composition and liquid (%) contained in residue.

The calculation results show the geometry of residues 1 and 2 BPP 4-5 able to accommodate the residue of $1.529.517 \text{ m}^3$ ($\approx 2.447.226,8 \text{ Ton}$) or can only accommodate the amount of *raw bauxite* of $5.497.213 \text{ Ton}$ or production of washed bauxite of $3.061.310 \text{ Ton}$. The remaining residual capacity of 1 is currently at 65.015 m^3 ($\approx 104.025 \text{ Ton}$) or can still accommodate the residual of raw bauxite production as much as $233,629 \text{ Ton}$ or bauxite washed production as much as 130.104 Ton . If based on data on the amount of reserves mined $9.672.566 \text{ Ton}$ and reserves washed bauxite $5.386.498 \text{ Ton}$ planned by PT. HPAM, it is predicted that there will be a residual capacity deficit of $1.148.389,319 \text{ m}^3$ (from $1.529.517 \text{ m}^3$) with duration of production period (residual life) is $1.300.605$ working days $\approx 3,563$ years (assuming 1 year 365 working days) and optimal composition the residue consisted of cobble-boulder 5.2% and non cobble-boulder 94.8%.