

ABSTRAK

RANCANGAN *MINE SEQUENCE* DAN TEKNIS PENAMBANGAN BIJIH NIKEL DI PIT DAMAR PT KSATRIA MITRA KONTRAKTOR INDONESIA

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PT Ksatria Mitra Kontraktor Indonesia (PT KMKI) merupakan perusahaan kontraktor nikel yang beroperasi di Desa Lelilef Sawai, Kecamatan Weda Tengah, Kabupaten Halmahera Tengah, Provinsi Maluku Utara, dengan sistem tambang terbuka menggunakan metode *block strip mining*. Seiring dengan hampir selesainya kegiatan penambangan di Pit Damar 4, perusahaan merencanakan pengembangan penambangan pada Pit Damar 5 dengan target produksi sebesar 250.000 ton/bulan serta menjaga nilai stripping ratio di bawah 1. Penelitian ini bertujuan untuk menyusun rancangan kemajuan penambangan (*mine sequence*), rancangan area timbunan (*waste dump*), rancangan jalan angkut, serta menghitung kebutuhan alat muat dan alat angkut guna memenuhi target produksi yang ditetapkan. Estimasi sumber daya dilakukan menggunakan metode *Ordinary Kriging* pada pemodelan blok (*block model*) yang dikombinasikan dengan teknik *Partial Percentage* untuk memperoleh estimasi tonase yang lebih representatif dan meminimalkan efek smoothing. Rancangan tambang disusun berdasarkan parameter teknis perusahaan meliputi geometri jenjang, *cut off grade* (COG) limonit 0,9–1,3% Ni dan saprolit >1,3% Ni, densitas material, serta kondisi topografi awal. Perancangan jalan angkut mengacu pada standar teknis yang berlaku, sedangkan kebutuhan alat mekanis dihitung berdasarkan analisis produktivitas dan waktu edar alat. Hasil penelitian diharapkan berupa peta rancangan kemajuan penambangan bulanan, desain area timbunan, rancangan jalan angkut tambang, serta jumlah kebutuhan alat mekanis yang optimal. Rancangan ini diharapkan dapat menjadi acuan teknis bagi perusahaan dalam mendukung kegiatan penambangan.

Kata kunci: mine sequence, block model, Ordinary kriging, Partial percentage, nikel laterit, kebutuhan alat mekanis

ABSTRACT

MINE SEQUENCE AND TECHNICAL DESIGN OF NICKEL ORE MINING OPERATIONS TO FULFILL PRODUCTION TARGET AT PIT DAMAR PT KSATRIA MITRA KONNTRAKTOR INDONESIA

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PT Ksatria Mitra Kontraktor Indonesia (PT KMKI) is a nickel mining contractor company operating in Lelilef Sawai Village, Central Weda District, Central Halmahera Regency, North Maluku Province, employing an open-pit mining system using the block strip mining method. As the mining activities at Pit Damar 4 are nearing completion, the company plans to develop mining operations at Pit Damar 5 with a production target of 250,000 tons per month while maintaining the stripping ratio below 1. This study aims to design the mine sequence, waste dump layout, and haul road design, as well as to calculate the requirements for loading and hauling equipment in order to achieve the predetermined production target. Resource estimation was conducted using the Ordinary Kriging method within a block model, combined with the Partial Percentage technique to obtain a more representative tonnage estimation and minimize the smoothing effect. The mine design was developed based on the company's technical parameters, including bench geometry, cut-off grade (COG) of limonite at 0.9–1.3% Ni and saprolite >1.3% Ni, material density, and initial topographic conditions. The haul road design refers to applicable technical standards, while the mechanical equipment requirements were calculated based on productivity analysis and equipment cycle time. The results of this research are expected to include monthly mine sequence maps, waste dump design, haul road design, and the optimal number of mechanical equipment required. This design is expected to serve as a technical reference for the company in supporting mining operations.

Keywords: mine sequence, block model, Ordinary Kriging, Partial Percentage, laterite nickel, mechanical equipment requirements.