Evaluation of Ground Support by Rock Mass Index and Finite Element Method Numerical Modelling PT Cibaliung Sumberdaya Banten

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Abstract

PT Cibaliung Sumberdaya is one of gold mining company which using cut and fill method for the underground mining system. In underground mining system, all activity doing in ground from surface. The common problem in underground mining activity is the instability of tunnel. Thus, the corrective action needed is evaluate the ground support system itself.

System of ground support certainly requires an analysis from a safety and economic part. Ground support system should be revised refer to mining progress or based on emerging technology in mining area. The evaluation aims to update the primary ground support system in mining which applied by recommendation of Geotechnical Unit, Dept. Quality Control, PT Cibaliung Sumberdaya classified by Rock Mass Rating (RMR) with the new ground support system classified by Rock Mass index (RMi) ones. The meaning of evaluation is to evaluate from a ground support quantity aspect (total split set requirement and thickness of shotcrete) and ground support effective aspect to gain a high safety value. Manual calculation about safety factor (FK) value, plastic zone, stress distribution surrounding the tunnel also available with added a total displacement and strength factor (SF) value from analysis of numerical calculation finite element method with Phase2 v.07 to ensure the empiric method. Result of research in 3 locations e.g Cikoneng Decline, Cikoneng Xcut 2B level 1125 North, Cikoneng Xcut 4 level 1065 Ore Drive 1 South, evaluation of ground support system by Rock Mass index (RMi) more efficient from support quantity and effective from support utility, also give a high value of safety factor for a tunnel.

Keywords: Underground Mine, Ground Support, Rock Mass Classification, Finite Element

1. Introduction

In geographic, PT Cibaliung Sumberdaya located in end South West of Java and in administrative located in Province of Banten. In astronomic, the location of PT Cibaliung Sumberdaya occur at 6˚ 30′ - 6˚ 52′ S and 102˚ 02′ - 105˚ 37′ E. To go to this location from Jakarta could be reached by car transportation via Jakarta – Serang – Pandeglang – Labuan - Cibaliung route in 6 (six) hour.

The purpose of this research is to evaluate the ground support by RMi with the ground support which applied in PT Cibaliung Sumberdaya and compare with numerical modelling (finite element method) to reach an effective and efficient ground support for the tunnel instability potential in underground mining. The limitation of this research is do in Cikoneng area only and the critical condition of stability (safety factor) calculated by Mohr-Coulomb failure criterion. The rock mass classified with Rock Mass index (RMi) by Arild Palmström (2000) and the numerical modelling was calculated and presented with software Phase2 v.07.

2. Theories (or Experiments)

2.1 Theories

Rock Mass index (RMi) is a classification system based on inherent of the rock mass. Basically, this system combine the compressive strength from the intact rock and the parameter of joint condition.