Reducing a quarry's greenhouse gas emission through air deck implementation

Rudy Heryadi1, Heru Utama2, and Leo Aprisko3

1. COO, PT Suma Yogara Sejahtera, South Jakarta, Indonesia 12810. Email:rudy.heryadi@breny.my.id

2.Junior Mine Manager,PT Indo Muro Kencana, Murung Raya, Central Kalimantan, Indonesia. Email:heru.utama@imkgold.co.id

3.Drill and Blast Engineer, PT Suma Yogara Sejahtera, East Petasia, North Morowali, Indonesia. Email: leoaprisko7@gmail.com

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# ABSTRACT

Generally, drilling and blasting are the most common methods for rock breaking in the quarry to get the desired fragmentation size. Several efforts have been made to reduce greenhouse gas (GHG) emissions in blasting operations at the quarry, especially through drilling and blasting design optimisation. One simple method for the drilling and blasting process that can increase blasting energy efficiency is the blasting method using air decking. By applying air decking, the use of explosives can be reduced, and proportionally, the environmental impact of the explosives usage can also be reduced. This research aims to determine how much GHG emissions can be reduced by air decking in one of the limestone quarries in Central Sulawesi, Indonesia. The air deck is installed at the bottom of the blast hole and is 0.3 m long. The blast hole has a 89 mm diameter, the total number of holes is 144, the average depth is 3.6 m, and the type of explosive used is ANFO. GHG emission calculations were carried out using emission factors in blasting activities and several input materials in the blasting process. The calculation result shows that estimated GHG emission reduction in quarries can be attained significantly, especially when compared with conventional quarry standards and those that have made energy-efficiency efforts in mining activities in their quarries. The total reduction of ANFO is 216 kg, which correlates with 283.6 kg CO2-eq of GHG emission reduction per blast. Approximately five blasts every month are conducted; therefore, it can reduce the GHG emissions to 1 418 kg CO2-eq per month. Reducing GHG emissions by implementing an air deck does not sacrifice the blasting result, whereas in this experiment, the blasting recovery obtained is 91%. The GHG emissions reduction potential from implementing an air deck in the limestone quarry in this research is approximately 7.5%.