

ESTIMATION OF BLASTED ROCK VOLUME USING QUANTITY OF EXPLOSIVES CONSUMED

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In Sri Lanka, calculation of blasted rock volume estimated in different ways by organizations. Commonly the weight of the explosive used for the blasting is taken for calculation. But, different organization (e.g.: GSMB, Dept. of Forest, Ministry of Defence, etc.) are using different methods. Some do not even take the weight of explosives used in to consideration. Because of the variation in the method of calculation, the calculated volume of blasted rock varies from organization to organization and also deviates from the actual yield, this has led to conflicts amongst different agencies, making implementation of mining regulations difficult. Therefore, finding a reliable and practicable method is highly necessary for regulation of quarries activities in Sri Lanka. Such a method is suggested by using powder factor [total weight of explosives used in the blast, kg / volume of rock generated in the blast, m³]. The volume of blasted rock is calculated by the given equation. The equivalent charges of all the explosives used in the blasting are added together, where the equivalent charge is obtained from relative weight strength of the explosive, taking ANFO as the standard, using the density and detonation velocity of the explosive. A common reliable and practicable method was found for calculating of blasted maximum rock volume:

$$\text{Maximum rock volume } [V_{\max}] = \left(\frac{1}{\text{Minimum PowderFactor}(.15)} \right) \times [0.0020l_0 + 0.0039l_1 + 0.3276x_1 + x_2 + 1.2774x_3 + 1.4788x_4 + 1.6422x_5 + 0.0016n_1 + 0.0025n_2]$$

Where:

l_0 [m] - *Delayed detonating cord*, l_1 [m] - *Safety Fuse*, x_1 [kg] - *Black powder*, x_2 [kg] - *ANFO*, x_3 [kg] - *Water Gel*, x_4 [kg] - *Emulsion*, x_5 [kg] - *Dynamite*, n_1 [Number] - *Detonator*, n_2 [Number] - *Electric Detonator*

Example: $V_{\max} = [0.005l_0 + 0.01l_1 + 0.72x_1 + 2.4x_2 + 3.12x_3 + 3.6x_4 + 3.84x_5 + 0.005n_1 + 0.008n_2]$ cubes

It has been demonstrated that powder factor calculations based on Relative Weight Strength are reliable and can form the basis of blast design.

Keywords: *velocity of detonation, blasted rock volume, explosives, powder factor*