Identification of Gold Ore Vein Characteristics Based on the Level of Alteration and Its Effect on Grinding energy Consumption in Kutawaringin Village, Kutawaringin District, Bandung Regency, West Java Province

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Abstract. The infiltration of hydrothermal solutions through structures that form veinlets with different alteration levels and variations in physical strength, will influence the consumption of grinding energy during processing operations.

This research uses a gold ore vein sample from the Kutawaringin area, Bandung Regency. The sample, in the field, is visibly analyzed, was tested in petrography and mineragraphy in the laboratory, so that it was known to be moderate and low alterated. Furthermore, Bond Ball Mill are tested to determine its energy consumption.

From the grinding test, the low alteration vein energy consumption is relatively the same whether coarsely or finely, while the alteration medium is lower. Medium and low alteration energy consumption, coarse and fine fractions are relatively constant, meaning that the optimum point has been reached. Low and moderate alteration energy consumption, the difference is quite significant due to different mineral composition and alteration. So that the impact on the selection of the type of grinding equipment, if the alteration is far more than the low alteration, more feasible choices based on the most vein, so it is more energy efficient. Although it results in decreased grinding production per unit time for low alteration type.

Keywords: alteration, gold ore vein, fraction, grinding energy

1 Introduction

Excellent tectonic conditions and the geological system of the Indonesian archipelago are very interesting to study, this is because in addition to being surrounded by a ring of fire, it is also located on the Eurasian plate extension in the southeast which is bounded to the south and west by the Indo-Australian plate (Indian Ocean) and from the east bounded by the Philippine sea and the Pacific plate[5]. This fact makes Indonesia rich in mineral resources making it one of the largest producers of metal minerals in gold, copper, nickel and tin. Specifically, the potential of gold metal ore is found in several areas, including West Java (Pongkor/Bogor, Jampang/Sukabumi, Ciseuti/Purwakarta, Pangalengan/ Soreang Regency of Bandung, Cikondang/Cianjur, Cikotok/Cibaliung/Pandeglang/Banten, Rejang Lebong (Bengkulu), Batu Hijau (Sumbawa-NTB) and others, which are part of the western segment of the Sunda-Banda Neogen Arc, which extends from Sumatra in the north across the southern part of Java and continues to the Maluku in the side east[3]. The formation of gold ore in some of the areas mentioned above, is very closely related to the rise of the remaining solution of magma to the surface of the earth through zones of structure such as faults, fractures and lithological contacts, known as hydrothermal solutions[7]. Hydrothermal solution is then mixed with meteoric water so that it undergoes a cooling process that forms veins (veinlets) with their shape depending on the cavity produced by the structure. During this process, the rock that is broken has undergone alterations followed by changes in physical properties and chemical composition. These changes include: changes in color, porosity, crystallinity, texture, hardness, etc.[6,10]. In the event of breakthrough of this hydrothermal solution, in addition to altering the rocks that are broken through it also forms ore veinlets with physical properties and varying degrees of alteration or oxidation such as strong teralterasi vein, moderate or medium teralterasi vein and unalterated or fresh vein[1].

As explained above with the diversity of physical strength of ore veinlets, it affects the reduction of ore size during the processing process[8]. This happens considering that in the ore reduction or comminution operations in the process, there is a reduction mechanism involving forces such as the impact force, compression force, abrasion/attrition force and shear force, which will directly affect the energy consumption of grinding.