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Geochemical Characterization and Mineralogy Control of Rocks to Assign Overburden Management

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ABSTRACT

This research is conducted at coal mine, located on Barito Basin, South Kalimantan, Indonesia. The purpose is to characterize geochemistry and mineralogy control of rocks for acid mine drainage prediction to prevent acid mine drainage formation. Rocks geochemical characterization of PAF (Potential acid Forming), NAF (Non Acid Forming), and uncertain material is obtained based on result of overburden geochemincal test comprise paste pH, NAG (Net Acid Generating), TS (Total Sulphur), ANC (Acid Neutralization Capacity), percentage of rocks mineral composition analyzed using XRD. The result of this reasearch shows material is classified into NAF material (81%) and PAF LC (Low Capacity) material (5%); PAF MC (Medium Capacity) material (10%); PAF HC (High Capacity) material (1%); an uncertain data (3%). NAF material is dominated by mudstone. Based on the research material of neutralization is low and comprise of silica, plagioclase, and aluminosilicate mineral thus acid mine drainage formation should be prevented uses dry cover method with encapsulation.

Keywords: Acid mine drainage; geochemical characterization; mineralogy; overburden.

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1. Introduction

The risk assessment related to overburden management plan is conducted as part of the mine closure planning, primarily based on geochemical characterization. In addition, material characterization is required but it is more important how and where the overburden material were placed.

Material characterization is to express the important risk of acid mine drainage such as PAF material then determine the specific of management method such as encapsulation, as a part of the placement strategy to minimize acid mine drainage risk. Actually, geochemical characterization method has no correlation with the field condition. Field conditions will bring up a variety of risks. For example the reaction rate increase exponentially, not linearly, with temperature. Furthermore, these risks will change with different placement techniques which vary on specific field. The common factor that controls risks level of actual risks include sulphur content, metal content, and mineralogy material, the physical properties of material (grain size and distribution, the rate of weathering), the structure of overburden due to the placement of the material (the path for the air and water movement), and climate [1]. Encapsulation system is a reliable method to prevent sulphide minerals exposure to the oxygen and water which is control acid mine drainage formation due to its low cost and less work done. In this method, the overburden material is classified into PAF, NAF, and uncertain.

Various studies to prevent acid mine drainage formation has been done however only focus on an evaluation of disposal construction and geochemical and mineralogical characterization [2] [3] [4] [5]. Alternative of encapsulation solutions is still focus on the conceptual design development [6].

Overburden material consists of 81% material NAF, and 19% material PAF. Rainfall record on site and its surrounding is about 401-500 mm/month. Overburden material has a potency to produce acid and also has high intensity of rainfall, it will potentially form acid mine drainage.

2 Objective

This paper aims to (a) characterize the geochemistry and mineralogy characterization of overburden rocks in the coal mine assosiated with rocks depositional environment which has potential of acid mine drainage (b) develop a prevention model of acid mine drainage formation and overburden management.