

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF RESEARCH

Aluminium is a silvery, white, soft, nonmagnetic, ductile metal that is the most abundant metal and it is the third most available element in the earth's crust. The main ore of aluminum is bauxite which a mixture of hydrated aluminum oxide ($\text{Al}_2\text{O}_3\cdot\text{H}_2\text{O}$) and hydrated iron oxide ($\text{Fe}_2\text{O}_3\cdot\text{H}_2\text{O}$). It is a metal that have high valuable properties. It has a density of 2.70 g/cm which is light, non-toxic, and can be cast easily or machined. It has lower density and is used widely for electrical transmission lines as it has an electrical conductivity 60% that of copper. Pure aluminum are strengthened by alloying with little amounts of silicon, magnesium, and copper despite it is very brittle and soft (Shakhashiri, 2012).

Bauxite is the principal ore of alumina ($\text{Al}_2\text{O}_3$), which is used to produce aluminum (Al). Iron oxides, hydrated iron oxides, hydrated aluminum oxides, hydrated aluminosilicates, silica, and titanium oxide are the main compound that made up bauxite. Bauxite also contains minerals such as, boehmite, ilmenite, hematite, Al- quartz, anatase, gibbsite kaolin, rutile goethite, and goethite. It is a residual rock that formed from the weathering of various, metamorphic rocks, igneous and sedimentary and these relative rocks are exposed to weather under tropical, subtropical, or very humid conditions of ninety percent of the world bauxite resources are in tropical locations for around millions of years. Other deposits besides the latitudes mentioned were exposed to a long intense weather condition in their geologic past.
Places like West Africa, South and Central America, and then in India, Australia, and Vietnam are where the greatest abundance of bauxite are in. Besides that, bauxite deposits also found in the center of Saudi Arabia and north of Russia. Basically, bauxite occurs near the surface of the earth with only 1 or 2 meter of overburden and common deposits range in thickness from 3 to 15 meter, but there are phenomenon of buried bauxite deposits where the bauxite are covered by other materials like the post-formation of bauxite. The recent global bauxite resource is estimated more than 70 billion tonnes and the greatest abundance is in Guinea, with resources of around 25 billion tonnes. The underground buried bauxite deposits are normally related to a surface occurrence where the land that helps the formation of the bauxite has tilted, so the ore found on the surface will gradually be deeper, and to economically extract for this material, underground mining is needed. In China, there was around 165 million tonnes of bauxite mined each year (Donoghue, 2014).

Figure 1.1: World Bauxite Provinces

Source: Geoscience Canada: Bauxite (1993)
Long time ago, Malaysia was very active in mining activities especially tin mining and other minerals but recently, Malaysia had suddenly emerged to become the source of bauxite worldwide. This incident happened in a flash back in January 2014, when Indonesia government banned the exports of bauxite ore to China to grow its own aluminium-smelting industry. Indonesia has stop as China's major bauxite supplier up to that point of time. After that, as the mining activities has stopped in Indonesia, some mining companies started to look at the hills above Kuantan where there are abundances amount of bauxite which is lower quality than in Australia and Indonesia. The Malaysia bauxite ore production raised from a small amount of 200,000 tonnes in 2013 to approximately 20 million tonnes last year in 2015 and now Malaysia is the world's top of bauxite ore producer as nearly half of the supply is sent to China.

In Pahang, most of the land has been used for settlers for development. Therefore, companies had to approach small companies whose land contain bauxite and offer them some large sums of money in exchange to mine their land (BBC, 2016).

However, the environmental disaster at Kuantan bauxite mining site is the consequences from the stacked with poor regulations, greed and corruption and enforcement. In less than five years, Malaysia’s bauxite reserves may be depleted based on last year’s sales to China alone. According to Jackie Wang, researcher from CRU Group Chinese, alumina refineries may seek bauxite from suppliers in Guinea and Australia instead (Bloomberg, 2016).

Tremendous problems have been cause by the uncontrolled bauxite mining activities in Kuantan that lead to water and air pollutions. Researcher and society has been fighting to tackle the problem arise. In addition, after the mining activities, the leftover mine site will be left unattended. Miners have no proper mining guidelines that leads to uneven soil level and leads to drain clogging that may cause flood to occur. Uneven level of soil produced a dangerous slope at the area that can cause landslide and another catastrophe. There is an uncertain doubt that what the people and society can do after all the surface bauxite have been mined in the future. The geotechnical properties and other data of Kuantan bauxite is very less and we need to know more about it to help the society moving forward.