INDONESIAN MINING JOURNAL

Abstract Index

Zulfahmi (R&D Centre for Mineral and Coal Technology)
Models for Physical and Numerical Slope Failure of Loose Sand Under Dynamic Loading
Model Fisik dan Numerik Kelongsoran Lereng Material Pasir Lepas Akibat Pembeban Mekanis

Excessive vibration that causes damage to model the medium such as mine slope can physically and numerically be modelled. The slope of this study simply represents the actual view of the slopes that has a smaller size than the actual one, while the numerical model is relates to a mathematical form of slope condition that based on physical and mechanical data of the medium. The slope failure has experimentally been built several variations. Effect of vibration is echieved by connecting the models into the vibration instrument with bearing that can horizontally move free in line within the determined track. The instrument is attached to a spring that can pull the model to side out. The spring is placed in an iron frame. Proviously, the slope has been formed in critical condition one (angle of 30°). Physical model and laboratory test results were used as an input for numerical modelling of the slope failure. Based on the numerical analysis, the SRF was 0.47 for D equal to 2 cm g around 0.0025. If the g's were around 0.0057 and 0.0088, the obtained SRF for both g's were 0.44 and 0.41 respectively. While the D of 4 cm and g of 0.0024 came the SRF of 0.54, the g of 0.0064 derived the SRF of 0.48, and the g of 0.0106 obtained the SRF of 0.44. For D equal to 2 cm and g 0.0024, 0.0106; the obtained SRF was 0.54, 0.48 and 0.44 respectively. Increasing the D to 6 cm within variation of g from 0.0025, 0.0062 and 0.0106, the SRF was 0.51, 0.48 and 0.44 respectively. It is assumed that there is a correlation between the thickness of quartz sand layer and the decrease of SRF value. The correlation also occurs between the increase in vibration (g value) and the SRF.

Keywords: Physical modelling, numerical modelling, vibration, seismic loading coefficient, strength reduction factor

Kurniawan, Ali R. and Hadijah, Nia R. (R&D Centre for Mineral and Coal Technology)
Comprehensive Environmental Evaluation of Bukit Asam Plant Coal Ash
Evaluasi Lingkungan Secara Komprehensif Terhadap Abu Batubara PLTU Bukit Asam

Indonesian government regulation No 85 year 1999 regarding management of hazardous material states that in order to identify and to define coal ash as hazardous material or non hazardous material, the coal ash should be evaluated by characteristic and toxicity tests. In this study, the properties of coal ash sample from Bukit Asam power plant were evaluated using chemical analyses and bioassay of Lethal Concentration (LC50-96 hour) and Lethal Dose (LD50-96 hour). The chemical analyses shows that the main chemical compositions of Bukit Asam coal ash were SiO_2 (60.6 %) and Al_2O_3 (22.8%). Bukit Asam coal ash was categorized as non toxic criteria as its LC50-96 hour value exceeded 100,000 ppm. Meanwhile, the result of LD50-96 hour shows that mortality of mice was not found in every dose given (500; 5,000; 15,000; 30,000; 50,000 mg/kg BW) for 0-96 hours of observation so it can be classified as a non hazardous material based on the Indonesian government regulation. The results of TCLP test reveal that the concentrations of all the heavy metals were invariably well below the permissible limits for discharge of effluents according to Indonesia regulation and US. EPA standard. Thus, it was also categorized as non hazardous material. Radiation dose of Bukit Asam coal ash was 0.41 mSv/year and it was under standard limits for human being (1 mSv/year). The mean heavy metal contents in Brassica chinensis tissues with three times cultivation were above the WHO limits level. However, the addition of 17.5% coal ash in growth media drastically decreased heavy metals content (Cu: 25.6; Pb: 66.6; Cd: 48.8 dan Cr: 8.29 %) into the lowest content. The results generated from this study indicated that Bukit Asam coal ash has a vast potential for reclamation of degraded coal mining land.

Keywords: coal ash, chemical content, characteristic test, toxicity test, radioactive element, heavy metal

Wahyu, Haifa (Pusat Penelitian Fisika - LIPI)
Effect of Combustible Content in Coal Ash Refuse on the Efficiency of Thermal Oil Heater System
Pengaruh Kandungan Mampu Bakar dalam Buangan Abu Terhadap Efisiensi Sistem Pemindah Panas Oli
IMJ, Vol. 15, No. 3, October 2012,
P. 130 - 139

This paper provides an analysis on the effect of combustible content in coal ash refuse the efficiency towards combustion and heat thermal oil heater system in a coal furnace had been studies. The study investigated the discrepancy the actual performance of the heater compared to that as stated in the design specification. The study assumed that coal type and operational problem were the cause of deviation. Both affecte combustion efficiency and the amount of reactive materials within coal ash refuse. Combustible content within the coal ash refuse was the used as the source data. Using indirect method, the amount of losses can be determined from the amount of combustibles in the coal ash refuse. The work involved measuring the temperature of oil and flue gas, analyzing the ash content and calculating the losses based on two sets of operational data. System efficiency and heat exchanger rating were calculated by reducing the amount of total losses from the full design capacity. If the reactive composition within the coal ash in combustible content, the amount of coal consumption is higher in order to attain the heat desired capacity for heating. Such a contition is caused by decreasing the energy capacity and reducing the furnace effectiveness.

Keywords: coal characteristics, combustibles in ash, combustion efficiency, indirect method

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Analysis of Term of Trade (TOT) of Indonesia's Bauxite
Analisis Term of Trade (TOT) Bauksit Indonesia
IMJ, Vol. 15, No. 3, October 2012,
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Indonesia does not have a processing unit for bauxite. As a result all raw materials are exported. In contrast, the alumina is imported to fulfill the domestic need for aluminum industry. In terms of evaluating bauxite export, term of trade (TOT) analysis was conducted. Method used to calculate the TOT is carried out using net barter of TOT formula. The parameter include the export price compared to the import one. If the bauxite price increases and the import price decreases, the TOT is surplus. Contrarily, if the export price decreases and the import price increases, the TOT is deficit. To calculate the ratio of the export volume against the import volume used the grass barter of TOT. The measured parameter is the export volume compared to the import one. If the export volume increases and the import decreases, the TOT is surplus. On the other hand, if the export volume decreases and the import volume increases, the TOT is deficit. In 2003, the net barter of TOT was 0.07 and the grass barter of TOT was 87,874, but in 2010, the net barter of TOT was 0.09 and the grass barter of TOT was 5,809.53. Results of the TOT values indicate that Indonesia was still the exporter of bauxite raw material with an average of export value was lower than that of the import one, although its volume was significant due to the very low price. Indonesian bauxite export value will increase, if the processing unit immediately established.

Keywords: term of trade (TOT), bauxite, alumina, export, import, foreign trade balance

Husaini; Tahli, Lili and Muta'alim (R&D Centre for Mineral and Coal Technology)
Impacts of Artisanal Gold Mining and Efforts to Minimize Negative Impacts to the Environment
Dampak Pertambangan Emas Rakyat dan Upaya Mengurangi Dampak Negatif Terhadap Lingkungan
IMJ, Vol. 15, No. 3, October 2012,
P. 146 - 158

Indonesia has extensive primary and secondary gold ore deposits that are scattered at several islands. The processing method for gold includes cyanidation, amalgamation and gravity concentration. Amalgamation is one of the most dangerous methods that pollutes the environment. The process is conducted by artisanal gold mining extensively throughout the country and involving around 100.000 miners. The process is started by crushing the ore up to 2-3 cm, then put in the trommel along with Hg and water. The trommel is then rotated for 4-5 hours to produce amalgam (Au-Hg) to be separated from its tailing by panning. The clean Au-Hg, mixed with liquid Hg, is then squeezed to separate the Hg excess. The Au-Hg, mixed with borax is then burnt in a crucible to evaporate its Hg and get the golds bullion (Au-Ag metal). The gold is obtained after the silver within the bullion is leached by HNO_3 equipment used for burning the Au-Hg is an open vessel that is operated in the kitchen at which the people also cook the food. This condition is very dangerous for the miner and their families as the Hg vapor is very toxic and can damage human lung. Another problem is that Hg-containing fine tailings are directly discharged to the river. This mercury can pollute the aquatic system and become dangerous for human through food chain. The efforts decreasing the negative effect of artisanal mining employ a retort to burn the amalgam, centralize the trommels; concentrate the gold ores prior to amalgamation. Jig, shaking table, sluice box can be used for upgrading the gold. If tailing with relatively high gold content would be processed by gravity concentration or cyanidation, the location for tailing gold processing should be safe and far from the river and houses.

Keywords: artisanal gold mining, small scale mining, amalgamation, retort, impact, environment, concentration