

A Process Model of Natural Attenuation of Heavy Metals in a Stream Contaminated by Acid Mine Drainage from Artisanal Gold Mining in Cambodia

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A geochemical modelling was implemented to understand the chemical behaviors on the natural attenuation of artisanal gold mining in Cambodia. Wastewater from the mine site rich of As, Se, Mn, and Fe concentration with pH 2.7 was discharged into a small stream nearby which is a tributary to the main river; Prek Te. In the dry season, the stream water was highly polluted. On the other hand, in the rainy season, the heavy metals concentration decreased to less than the WHO drinking water standard without any treatment before mixing with the main river. Schwertmannite is a major mineral precipitated on the stream bed when the pH in the stream increases from 2.8 in the dry season to 3.5 in the rainy season due to other input sources included rainwater and its small tributaries water. The dilution factor and surface complexation model of the contaminated stream was conducted to represent the stream condition in reality. Schwertmannite was used as an adsorbent for the surface complexation model for different pH to see the effectiveness of the sorption process. As and Se were effectively reduced by co-precipitation and adsorption by schwertmannite at pH 3.5 while Mn decreased by water dilution. Based on the natural attenuation process the water quality remediation in the dry season is suggested to increase pH to 3.5 before the stream water mixing with the main river.

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