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DEVELOPMENT OF LIMESTONE-BASED PASSIVE TREATMENT SYSTEM FOR COPPER-RICH ACID MINE DRAINAGE

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ABSTRACT – This study developed a system intended to treat a copper-rich acid mine drainage (AMD) in a legacy mine in Sto. Niño, Tublay, Benguet, Philippines. Based on previous sampling campaigns in the area, Cu and Mn concentrations and pH exceed the local effluent standards. Using local limestone as the media for treatment of AMD, several laboratory experiments using synthetic AMD were conducted to identify the effective particle size and hydraulic retention time. Consequently, the parameters identified were then deployed into a pilot-scale system investigating the effectiveness of an oxic and anoxic system for the actual AMD. Conducting the analysis, it has revealed that a hybrid of oxic and anoxic system with variable particle size and hydraulic retention time may be deployed considering the unsteady condition of the stream in the legacy mine. In Consideration of the topography of the mine site, a hybrid multi-stage limestone leach bed and packed bed has been deployed. With regular monitoring of the system, it showed an effective removal of Cu and Mn and increase pH of the stream. This observation thus addresses the threat of AMD in the area. However, improvement in terms of the lifespan of the system needs to be demonstrated as common issues of armoring from high concentration of Cu is observed resulting in the reduction of treatment performance over time.

Keywords: Legacy Mines, Acid Mine Drainage, Passive Treatment, Heavy Metals, Treatment Performance.

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