Neutralization of Acid Mine Drainage Using Stabilized Flue Gas Desulfurization Material

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ABSTRACT

Unreclaimed mine lands present serious threats to human health, public safety, and environment. It is estimated that, in Ohio, about 1,300 miles of streams in the state have been impacted by acid mine drainage (AMD) produced from unreclaimed mine lands. Using coal combustion by-product (CCBs), e.g., flue gas desulfurization (FGD) by-products, as a backfill material can be an effective and economical approach to reclaim mine lands and neutralize AMD. In this study, the effectiveness and potential environmental impacts associated with AMD neutralization using stabilized flue gas desulfurization (FGD) material are investigated. The effect of pH on the intrinsic leaching behaviors of the stabilized FGD materials while contacting with AMD are investigated using protocols modified from USEPA's methods. The partitioning of constituents in the liquid and solid phases as a function of liquid-to-solid ratio (L/S) under percolation conditions are being determined under both laboratory- and bench-scale settings. A number of potential placement designs of stabilized FGD material against a mine highwall for AMD treatment are presented in a bench-scale mine highwall reclamation testing module, which is a rectangular tank (dimensions 12'x4'x3'). The testing module has pre-installed sampling ports for water pressure measurement and leachate collection. The study simulates the leaching conditions similar to AMD penetrating stabilized FGD material during and after mine highwall reclamation. A percolation column leaching test is also carried out. The objective is to characterize the releases of constituents from stabilized FGD under relevant real-life AMD neutralization scenarios. The overall goal of this project is to promote the high-volume beneficial use of CCB in a manner that is economically viable and beneficial to the environment, the public's health and safety, and the coal combustion energy generating industry. Results obtained from the laboratory- and bench-scale studies will be presented and discussed.