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CHARACTERIZING THE HYDRAULIC PROPERTIES OF COAL COMBUSTION BY-PRODUCTS

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ABSTRACT: Coal combustion by-products (CCCs) disposed of in unlined landfills can impact the quality of water resources. CCBs have been found, in previous studies, to leach arsenic, mercury, and lead along with other toxic heavy metals into groundwater. This has led to recent proposals to regulate the disposal of these materials. In the past, many locations have disposed of these CCBs in unlined landfills. Such unlined landfills can contain pits of well over 100 feet deep containing CCBs. Understanding the hydraulic properties of such byproducts could be highly beneficial in understanding the impact this method of disposal is having. Byproducts from coal combustion include fly ash, bottom ash, and gypsum. This research is mainly going to focus on fly ash and bottom ash. Samples have been collected from a mine located just north of Farmington, New Mexico near the Colorado Border. Both fresh ash samples from the nearby power plant as well as cores from the landfill pits are included. Falling head tests are being conducted at the in situ densities for the cores in order to determine the saturated hydraulic conductivity. Hanging column tests, pressure plate tests, and a dew point potentiameter measurements are being utilized to determine the moisture characteristic curve for the unsaturated zone, also known as the vadose zone. As for the fresh ash samples, different densities will be used. These densities have been determined through consolidation tests using the loose unit weight of the ash in order to simulate the same environment as it being dumped into the landfill. These samples will then run through the same tests of falling head permeability, hanging column, pressure plate, and use of a dew point potentiameter in order to determine the hydrologic properties.Results from this research could be very useful in understanding the effects of unlined landfills used to dispose of CCBs as well as future use in the hydrologic modeling of similar landfills.

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