

Determination of Expansion Potential of Coal Utilization By-Products

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ABSTRACT

Expansion of some coal utilization by-products (CUBs) is of great concern, especially when these materials are utilized as engineered fills or in other bulk placements. Some CUBs, especially some fly ashes, have the potential to swell, and the expansion or swelling can result in failure of the fill to meet performance criteria. The potential for a CUB to swell or expand can be determined using a simple test for bulk density. Initially, the density of as-managed fly ash is determined. The fly ash is then placed on a rotation or agitation device and hydrated using distilled, deionized water for a desired length of time. Generally, the fly ash is hydrated for 30 days, after which it is filtered, dried in an oven below 50°C, and the final density determined. A negative change in the density from the as-managed or as-received sample to the hydrated sample can be interpreted as swell or expansion potential of the fly ash. Subsequently, the 30-day hydrated ash can be rehydrated as before for 30 additional days, and the density redetermined, which will provide insight into the long-term expansion potential of the fly ash. Helium air pycnometry, a quick and nondestructive method, was used for density determinations, although other methods are available. Quantitative x-ray diffraction was used to determine specific species responsible for the expansion observed.

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