

Evaluating Expansion Potential of CCBs

David J. Hassett

University of North Dakota, Energy & Environmental Research Center, 15 North 23rd Street, Grand Forks, ND 58203

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ABSTRACT

Following review of an evaluation of a variety of American Society for Testing and Materials (ASTM) methods to determine swell and expansion of materials, the Energy & Environmental Research Center (EERC) concluded that common expansion test methods are very similar in nature with modifications for use with varying materials. ASTM does not list a coal combustion byproduct (CCB)-specific test, nor do the existing methods and modified methods provide quality-assured data on swell potential for CCBs. Several mechanisms have been proposed for reactive or high-calcium CCBs. Reactive CCBs include moderate- to high-calcium fly ash, fly ash–dry flue gas desulfurization mixtures, and fluidized-bed fly ash. The proposed expansion mechanisms in these materials differ greatly from expansion mechanisms associated with soils, so the application of expansion tests designed for soils may be inadequate.

The EERC has initiated development of a test to predict expansion potential for CCBs. The test under development is based on material density. Densities of material suspected of having swell potential are determined using ASTM C 188-89, Standard Test Method for Density of Hydraulic Cement. The sample of interest is tested for density using C 188, and then the same material is hydrated, dried at 53°C, and retested. Reduction in density can be related to swell potential based on proposed expansion mechanisms. Currently available data will be presented along with x-ray diffraction of hydrated and unhydrated samples.

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