

# **Evaluation of the Durability of Mortar and Concrete Produced from CSAB Cements that Utilize Circulating Fluidized Bed Combustion Byproducts.**

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## **ABSTRACT**

The utilization of circulating fluidized bed combustion (CFBC) ash to make cement products that provide added value and offset CO<sub>2</sub> production is the objective of this research. CFBC burns coal in the presence of a bed of slaked limestone, which effectively absorbs sulfur dioxide (SO<sub>2</sub>) to form anhydrite (CaSO<sub>4</sub>). CFBC produces two kinds of spent bed materials, coarse bottom ash and a much finer fly ash. Both of these products are very high in calcium. When properly conditioned these materials are capable of acting as hydraulic cements, forming both calcium aluminosulfate minerals, most importantly ettringite, as well as calcium-alumina-silica gels, like that formed from Portland cement.

The research to generate CSAB cement was centered on two components. The first was the production of a cement that maximizes the proportion of Kentucky coal combustion byproducts while achieving acceptable strength development. The second research component was the evaluation of the durability of mortars and concrete prepared from the CSAB cement. Issues to be addressed include strength optimization, dimensional stability (e.g. shrinkage and expansion), and durability (e.g. freeze-thaw, chlorination and carbonation resistance). The CSAB cements produced from the CFBC byproducts are comparable to both a Type 1 ordinary Portland cement and a commercially produced CSAB cement from China.

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