SAMPLING, CHARACTERIZATION, AND BENEFICIATION OF STOCKPILED FLUIDIZED BED COAL ASH IN ROAD BASE COURSE APPLICATION

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ABSTRACT

Although fly ashes and bottom ashes generated at coal-burning fluidized bed type power plants exhibit excellent cementitious characteristics, they also contain a prohibitive amount ettringite-producing sulfates which can induce excessive, sulfur-induced expansions and volume changes. This has discouraged their use in many soil and roadway stabilization applications. For this reason, a significant amount of these by-product ashes have been relegated to land fills and / or stockpiles. One such stockpile located at the Twin Oaks Power Station (TOPS) in Bremond, Texas was sampled in a manner to evaluate any changes which various lengths of time on the pile may have had on the chemical and mineralogical make-up of the ashes. This investigation revealed that, under prolonged weathering and exposure to the elements, the stockpiled ash material had undergone advantageous mineralogical changes whereby the deleterious sulfates present in the unaged material were stabilized in a manner to reduce their potential for sulfate-induced expansions. This was followed by a research effort to employ the improved stockpiled ash in a number of roadbase and soil stabilization applications.

This paper presents a stockpile sampling, mineralogical analysis and mix design rationale for utilizing stockpiled fluidized bed ashes in road base course construction and soil stabilization. The methodology and evaluation criteria used in this study were in accordance with Texas Department of Transportation (TxDOT) guidelines. Both untreated and cement treated mix designs were evaluated. The laboratory program included unconfined strength measurements as well as triaxial, volumetric swell, and moisture susceptibility testing. Analytical tests included IRA and X-Ray Diffraction.

The results have shown that, unlike the original “as produced” material, the weathered stockpiled ash possesses very little residual cementitious activity. However, when stabilized with small amounts of cement (3%), it met TxDOT strength criteria for cement treated base course construction and significantly reduced the potential for sulfur-induced volumetric swell. These results have initiated an investigation for accelerating the aging process in “as produced” ashes to eliminate the need for cement and minimizing the amount of material going to the stockpile.

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