

USE OF CLASS F FLY ASH AND CLEAN-COAL ASH BLENDS FOR CAST CONCRETE PRODUCTS

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ABSTRACT

High-sulfur coal ashes, particularly those obtained from clean coal technology, are not extensively utilized in the cast concrete masonry products (bricks, blocks, and paving stones) industry. This project was directed toward developing cast (masonry) concrete products incorporating large amounts of ashes generated from combustion of high-sulfur coals generated from both conventional and clean coal technologies. A clean coal ash is defined as the ash derived from SO₂ control technologies. Fifteen high-sulfur coal ash samples were obtained from eight different sources and tested for their physical, chemical, mineralogical, and microstructural properties. Based on these properties, two sources of both conventional (Class F) and clean coal ashes were selected for further investigation. Two additional ash samples were prepared by blending these selected conventional and clean coal ashes. Using these six different ash samples, eleven masonry mixtures were proportioned for initial testing and evaluation. From results obtained in the initial phase, twenty-one additional masonry mixtures were proportioned. Strength and durability testing of the final mixtures revealed that masonry products can be manufactured with cement replacement in the range of 0 and 60 percent by high-sulfur coal ashes (Class F and clean-coal ashes) and coal ash blends (Class F plus clean-coal ash blends). Based on results obtained in this investigation, several mixtures are recommended for a pilot scale manufacture of cast concrete products.