Concretes and Fly Ashes from a Full-Scale, Concrete-Friendly™ C-PAC™ Mercury Control Trial

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ABSTRACT

If power plants across the country adopt traditional powdered activated carbon injection to meet state and federal mercury reduction requirements, vast volumes of quality fly ashes will no longer be able to be sold as a replacement for cement in concretes. Sorbent Technologies has developed a brominated carbon-based mercury sorbent, C-PAC™, which adsorbs very little of the air-entraining admixture (AEA) that is the root of the problem. C-PAC™ was recently tested at full-scale at Midwest Generation's Crawford Station in Chicago for nearly a month-long period. Injected before the plant's small electrostatic precipitator at 4 lb/MMacf, it averaged over 80% mercury removal due to the sorbent alone in the long-term testing. Crawford burned PRB subbituminous coal and usually sells much of its fly ash as a cement substitute.

This paper presents the results of an examination of the fly ashes and resulting concretes from the Crawford C-PAC™ trial. Three areas will be discussed: (1) characterization of the resulting fly ashes from both the front and back hoppers, including their mercury content, LOI, and mercury stability; (2) measurement of the adsorption of AEAs by the fly ash using the foam index method and a newly-developed adsorption isotherm method; and (3) evaluations of the properties of concretes made using the fly ash, including their air content, air void distribution, setting time, and compressive strength. Measurements will be reported from Sorbent Technologies, as well as by two of the largest ash marketing companies in the U.S., Headwaters Resources and Lafarge North America.

See also the companion paper by Ronald Landreth on the mercury reduction performance of C-PAC™ at the Crawford Station.

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