RESEARCH ON THE ENVIRONMENTAL AND ENGINEERING BEHAVIOR OF COAL ASH IN DISPOSAL SETTINGS[1]

by

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Abstract. A multiyear, U.S. Department of Energy-sponsored study of the environmental and engineering behavior of disposed solid wastes from advanced coal processes (FBC, CFBC, and LIMB) is currently in its third year, providing important data on the long-term behavior of ash at field sites in Ohio, Illinois, and Colorado. Comprehensive monitoring of disposed ash in field test cells has provided much-needed data on the physical, chemical, and mineralogical properties of ash and soils, composition of leachate, and impact on groundwater quality.

This paper discusses the significant physical and chemical changes in the test cell environment to date. The focus of monitoring and analytical work on the project involves basic characterization of the test cell materials and environment, and also study of the relationships between water content (balance), mineral development and evolution in the disposed ash, leachate generation and evolution, and impact of ash disposal on the surrounding soils and groundwater.

For example, the mineral ettringite, $Ca_6Al_2(SO_4)_3(OH)_{12}\cdot 26H_2O$, increased with time to form as much as 55 weight percent of a hydrated LIMB from Ohio and up to 33 weight percent of an FBC ash from Illinois. Significant changes in the strength and permeability of the ash have attended the mineral growth. The quality of leachate extracted from the cells using pressure-vacuum porous cup lysimeters, supported with leaching tests of core material in the laboratory, indicate initial composition is primarily sulfate based, but over time percolation through the test cell can reduce the concentration of sulfate and other constituents including calcium, potassium, and chloride.

The results of this research project have been instrumental in developing methods and procedures for monitoring and testing of these types of materials, as well as generating a comprehensive database on chemical and physical behavior of disposed ash from advanced coal processes. This type of information is increasingly requested by industry and regulatory agencies for evaluating ash disposal in landfills and mine pits all across the country, and particularly in regions where solid waste rules may impact plans for ash utilization or disposal.

This manuscript was unavailable for inclusion in the published proceedings. A copy of the paper is available by contacting the author at the Energy and Environmental Research Center, University of North Dakota, Box 8213, University Station, Grand Forks, North Dakota 58202. Phone: (701) 777-5000.

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