Characterization of Coal Combustion By-Products from Two Stoker Boiler Systems

O'Keefe, J.M.K.[1,2] and Hower, J.C.[3]

[1]Morehead State University, Department of Physical Sciences, Morehead, KY 40351
[2]University of Kentucky, Department of Earth and Environmental Sciences, Lexington, KY 40506
[3]University of Kentucky, Center for Applied Energy Research, 2540 Research Park Dr., Lexington, KY 40511

Keywords: coal, ash, combustion by-products, stoker boiler

Coal and combustion by-products were sampled two small stoker units at Morehead State University. Samples were analyzed for petrographic and chemical composition. Petrographically, they are coke and glass-rich, with significant quantities of unburned coal present in bottom ashes. While a single low-sulfur high volatile A bituminous coal source is used for both boilers, there are significant differences in the combustion by-products of the two boilers. Unit 2, a spreader stoker, produces more carbon (dominated by anisotropic coke) in the fly ash and more glass in the bottom ash than Unit 3, an underfeed stoker. Unit 3 displays significant increases in Manganese, Arsenic, and Lead toward the cool end of the system. Detectable selenium is present in the multicyclone on boiler 3. Total mercury capture is greater in Unit 2 than in Unit 3, with greatest capture in the multicyclone and baghouse.

Submitted for consideration in the World of Coal Ash 2007 Conference, held May 7-10, 2007