The Leaching Behavior of Arsenic and Selenium from Fly Ash

Tian Wang[1], Jianmin Wang[1], Joel Burken[1], and Heng Ban[2]

[1]University of Missouri – Rolla, Department of Civil, Architectural & Environmental Engineering, Rolla, MO 65409; [2]University of Alabama at Birmingham, Department of Mechanical Engineering, Birmingham, AL 35294

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ABSTRACT

According to Federal Regulations, the Maximum Contaminant Level (MCL) for arsenic in drinking water needs to be reduced to 10 ppb from the current 50 ppb level by January 2006. Fly ash could be a potential source of arsenic pollution. Understanding the leaching behavior of arsenic from fly ash is significant in predicting the arsenic impact on the drinking water quality and in developing innovative technologies to control arsenic leaching. The leaching of selenium from fly ash is also of concern.

This project focuses on the interactions between different arsenic and selenium species and fly ash. The overall objectives of this project are: (1) to investigate the leaching behavior of arsenic and selenium from fly ash under different environmental conditions; and (2) to quantitatively understand the leaching behavior of arsenic and selenium based on the physical-chemical characteristics of the fly ash surface and the environmental conditions.

Ash samples collected from different power plants are used. A method developed by our group is employed to determine the ash surface acidity. X-ray photon spectroscopy (XPS) and scanning electron microscopy (SEM) techniques are used to determine the surface composition, oxidation states of elements, and surface structure. Equilibrium leaching experiments are conducted to determine the metal partitioning/leaching in fly ash under various conditions. Our recently developed mathematical models for the adsorption/desorption interactions will be verified and used to quantify the leachability of arsenic and selenium from fly ash. We will report on results of batch leaching studies on samples collected from a power plant burning eastern bituminous coal.

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