The Release of Base Metals During Acidic Leaching of Fly Ash

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ABSTRACT

More than 100 million tons of coal combustion by-products are generated by U.S. power plants each year. Fly ash makes up 60% of that total and typically contains 10% (6 million tons/yr) of leachable metals and metal oxides. These metals could potentially leach into the environment. The metals studied for this paper include copper, lead, manganese, nickel, and zinc. The toxic metals antimony, arsenic, barium, cadmium, mercury, selenium, etc. are also found in trace amounts and are reported in a separate paper. Most of the metals leach readily from the fly ash in an acidic environment resulting in a surge of metal values in the leachate when the initial alkalinity in the fly ash is neutralized. The metals concentration in the leachate drops rapidly after this initial surge. The DOE is investigating the leaching of fly ash in 5-cm by 1-meter columns. Seven common lixiviants from pH 1 to pH 11 were used. Each column is leached with 130 ml/day of one lixiviant for 30 to 120 days. The leachate is analyzed for metals, sulfate, pH, alkalinity, and conductivity. Tests have been completed on 28 fly ash samples. Metal recoveries varied greatly among fly ashes, but values could usually be increased or decreased by changing leaching conditions.