

Leaching of Selected Constituents from Ammoniated Fly Ash from a Coal-Fired Power Plant

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ABSTRACT

A laboratory effort was undertaken to obtain quantitative data on leaching of ammonia, nitrite and nitrate, and trace elements from ammoniated fly ashes. A single sample of power plant fly ash was first ammoniated in the laboratory to generate three different samples containing low, moderate, and high concentrations of ammonia. These three ammoniated ash samples were subjected to batch equilibrium tests in the laboratory. In the first set of laboratory experiments, the three ammoniated ash samples were extracted in duplicate at four liquid-to-solid ratios. Leaching was carried out with gentle agitation for 24 hours. The leachates were analyzed for pH, nitrite, nitrate, ammonia, sulfate, mercury, fluoride, chloride, bromide, aluminum, barium, chromium, copper, molybdenum, nickel, zinc, boron, arsenic, cadmium, selenium, and vanadium.

Preliminary leaching results clearly demonstrate that ammonia is a highly soluble and easily leached constituent from fly ash. Leaching of ammonia appears to be linearly related both to ammonia concentration in the ash and leaching ratios. Nitrite and nitrate were not detected in the leachates because ammonia in the ash is not readily converted to nitrate and nitrite. The presence of ammonia in fly ash does not change leaching characteristics of aluminum, barium, boron, chromium, copper, sulfate, chloride, and bromide contained in fly ash. Ammonia in ash results in decreased leaching of cadmium, nickel, and zinc contained in fly ash. However, the increasing levels of ammonia in fly ash increase leaching of arsenic, selenium, fluoride, and vanadium. Arsenic and selenium leaching chemistry appears to change the most because of the presence of ammonia in fly ash.