Metals in Leachates of Soil, Biosolids, and Fly Ash

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ABSTRACT

Although laboratory and field studies show that addition of fly ash may increase carbon sequestration in reclaimed mine soils, the use of such amendments must overcome public concerns about possible release of toxic metals before the practice is generally accepted. Towards this end, we conducted experiments to examine the leaching of metals by several fly ashes (both class F and class C) under mild environmentally relevant extraction procedures (hot water and mild acid). In general, the greatest variability was seen in the extraction of the heaviest (e.g., Cr, Pb, As, Ni) and lightest (e.g., Li, B, Na, Si, Mg, Ca) elements from fly ashes. We also examined if mixing of the fly ash with soil and biosolids influenced leaching and if the biosolids alone were a concern for release of metals. Both biosolids and fly ash appeared to contribute to leaching of some metals in the column leaching studies. Fly ash appeared to increase the amounts of B and As observed in the leachate. When fly ash was combined with soil, biosolids, and other amendments (phosphate fertilizer) significant decreases in the leachable amounts of Cr, Li, Pb, and Cd were seen, often to levels below our detection limits, when compared to leachates from fly ash or biosolids alone. Thus, application of fly ash together with other amendments such as biosolids to soils results in minimal leaching of metals.