ENHANCING CARBON SEQUESTRATION AND RECLAMATION OF DEGRADED LANDS WITH FOSSIL-FUEL COMBUSTION BYPRODUCTS

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As part of our studies of fly ash amendments to soils to increase C sequestration, a series of experiments designed to address public concern over the release of toxic metals from fly ash and biosolid amendments were conducted through laboratory column leaching procedures. Experiments tested if leaching of potentially toxic materials was influenced by mixing of the fly ash with soil and biosolids and if the biosolids could be a concern for release of metals. Results taken from this simulated weathering or leaching were examined using a standard biosensor-based measurement technique for testing toxicity of water and soil. The testes showed there was little potential for leaching of toxic metals from the mixtures.

Fly Ash from five different sources was tested (TVA Paradise, Hayden, Cherokee, Harrington, and Martin Lake) using five different treatment applications. Treatments included replicate samples of 0, 10, and 35% fly ash with biosolids mixed 1:1 with soil, 100% fly ash, and soil blanks. Samples were placed in the bottom of leaching columns (Figure 1) and 100ml of 5mM calcium chloride was slowly added. Both biosolids and fly ash appeared to contribute to leaching of some metals in the column leaching (Figure 2). The presence of elevated concentrations of these elements in the biosolid treatments that received fly ash indicated the contribution of the biosolids to the metals in the extracts. Although potentially toxic metals can be leached from the fly ash using mild methods of leaching, for many of the most toxic elements leached the concentrations were very low. Examination of combinations containing only soil and biosolids indicated that many of the metals detected

Figure 1: Leaching column.

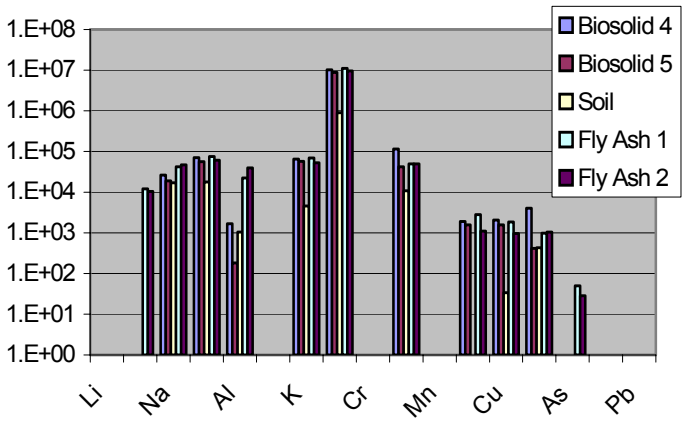

Figure 2. Column leaching of mixtures of amendment materials. Ratios of fly ash/biosolids/soil are as follows: Biosolid 4 = 0/4/6; Biosolid 5 = 0/5/5; Soil = 0/0/10; Fly Ash 1 = 1/4/5; Fly Ash 2 = 2/3/5.

in the analysis of the biosolids were not present in detectable amounts in the leachate of the column experiment.

Preliminary examinations of the data from measurements of toxicity using the Microtox system indicate the low levels of metals leaching do not result in detectable levels of toxicity.

More about this work.