

Chemical Fixation of Trace Elements in Coal Fly Ash

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ABSTRACT

More than two-thirds of the coal combustion by-products (CCBs) produced in the United States are disposed of in dry landfills or in wet ash lagoons. Most of the older ash disposal sites are unlined and many are unmonitored. The EPA is currently developing national standards for monitoring groundwater at CCBDF sites in the U.S. Development of effective techniques for *in situ* chemical fixation of trace elements in ash at closed CCBDFs would save the U.S. electric utility industry billions of dollars in costs associated with excavation and lining of older disposal sites.

Two treatment solutions were experimentally investigated as potential chemical fixation agents for trace elements present in fly ash collected at four different sites located in the Southeastern United States. Both treatment solutions contained the same concentration of ferrous sulfate, but calcium carbonate was added to the second solution to buffer the pH. The effectiveness of the treatment methods was evaluated through sequential batch leaching of treated ash samples using synthetic acid rain (SPLP). The best overall treatment method is FS at the 1:30 solid:liquid ratio. This treatment produces the lowest SPLP mobility for Mo and Sr (all ash samples), for B, Se and V (3 of the 4 ash samples) and for As (2 of the 4 ash samples). Overall reduction in trace element mobility after FS 1:30 treatment was As by 23-73%, B by 43-80%, Cr by 45-77%, Mo by 77-98%, Ni by 12-58%, Se by 49-92%, Sr by 29-58% and V by 41-53%.

The chemical fixation treatment method developed is inexpensive, stable during prolonged leaching by acidic precipitation and easily implemented at closed CCBDF sites. In addition, the fixation technique may make possible increased utilization of CCB materials which have limited reuse potential due to their trace element contents.

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