

Release of Mercury to Air from Coal Fly Ash

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ABSTRACT

This study reports results of laboratory and field measurements of flux of mercury to air from coal ash. Laboratory tests were performed on more than 20 fly ash samples derived from bituminous, subbituminous, and lignite coals, including samples collected from two mercury control demonstration projects. Laboratory volatilization experiments were performed using a gas exchange chamber with varying light, temperature, and moisture conditions. Similar apparatus was used to measure emissions at one ash disposal field site.

Most bituminous and subbituminous samples of fly ash were sinks for atmospheric mercury, exhibiting negative mercury flux (i.e., mercury deposition) in contact with ambient air under both light and dark conditions. Five of six lignite ash samples exhibited positive flux, indicating low emission rates. Addition of moisture to samples that had been exposed to atmospheric mercury for several months resulted in increased flux. Six fly ash samples collected from two demonstration projects where activated carbon sorbent was injected upstream of the electrostatic precipitator for enhanced mercury control were also tested. Both baseline and ash/sorbent samples were sinks for atmospheric mercury, with deposition rates increasing slightly for the ash/sorbent samples.

In situ mercury flux was measured at a bituminous coal ash disposal site in Pennsylvania in late fall 2002. Measurements were made at several locations on the site, including open ash areas, vegetated areas, and covered ash over a one week period. The measurements indicated primarily deposition of mercury to the ash, suggesting the site was a sink for atmospheric mercury during the study period.