

Element Mobility from Fresh and Long-stored Acidic Fly Ashes

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ABSTRACT

The mobility of major and trace elements in a series of coal ashes stored in dams and similar repositories for up to 25 years, has been investigated in relation to the mobility of the same elements from the fresh, dry ash material, to provide a basis for assessing the long-term changes in element mobility associated with disposal sites. Laboratory testing at different initial pH values indicates an increase in the natural (acidic) pH and the buffering capacity of the ash by contact with water during handling and storage, suggesting loss of ions such as SO_4^{2-} from the surfaces of the ash particles with even relatively brief water contact. Most elements show lesser degrees of mobility from ashes stored under water, even if only for a relatively short period, than from the fresh dry material. There are, however, some exceptions, such as Mo, which appear to have increased mobility from the longer-stored ashes.

Relatively little difference is noted between the mobility of most elements in the water-stored ashes, regardless of whether they were only recently emplaced or have been in the dam for 20 years or more. This suggests that equilibrium has been established with the pore water, and that once the readily leached fraction had been removed the ash remained relatively stable with time. The ash in an area where water-laid material has been drained and exposed to dry storage conditions for many years, however, showed similar leaching characteristics to the fresh dry ash. This suggests that elements may re-attach in some way to the ash particles with exposure after drying, or that additional elements of similar characteristics may be released, allowing a new set of equilibrium conditions to be established.

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