

# Variations in Element Mobility from Fly Ashes Stored in Different Environments

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## ABSTRACT

The leaching characteristics of acid and alkaline PF ashes emplaced below water level in freshwater ponds and estuarine lagoon areas for up to around 25 years, and also in dry emplacement installations, has been evaluated by batch testing, using solutions of different initial pH, different liquid:solid ratios and different leaching times. The results were compared to the leaching characteristics of fresh dry fly ash from the relevant power stations, as a basis for predicting the long-term behaviour of coal ash in different types of emplacements.

The fresh dry fly ashes had natural pH values in water ranging from around 4.5 (acid ash) to 12.0 (alkaline ash), with all ashes exhibiting a strong buffering capacity. Ashes from the same power stations stored in water had more neutral pH values than the equivalent fresh dry materials, ranging from 6 to 7 for the acid ashes and 7.5 to 8.5 for the alkaline ashes, depending on test conditions. Dry-stored ashes showed characteristics that were much more similar to the original material. Ashes stored under water for long periods of time and ashes from the same source recently deposited in water both had similar pH characteristics. The water-stored ashes showed a greater variation in pH with different leaching reagents, suggesting a reduction in buffering capacity with the immersion process.

While loss of some mobile elements may take place on contact with water, the different pH values developed in the water-stored ashes, compared to the equivalent fresh ashes, appear to be responsible for changes in mobility of some of the major and minor elements present. These changes suggest that laboratory testing of fresh dry ash alone, especially at its natural pH level, does not necessarily provide guidance on element mobility from the same ashes after they have been stored under water in the short or long term. Ashes stored under dry conditions (above water table) tend to show leaching characteristics closer to those of the fresh dry ash, although some mobilities may vary in near-surface locations due to rainfall and other exposure effects.

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