

# Prerequisites for using trace and rare-earth elements from the fly ash of Ukrainian thermal power stations

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## ABSTRACT

The rare-earth element (REE) concentrations, outlook coefficient and critical parameters of coal fly ash (CFA) samples from three Ukrainian thermal power stations – Prydniprovsk, Zmiivska and Kryvorizka TPS – are favourable for recovery of rare-earth elements, particularly following flotation treatment to remove unburnt carbon which also improves their performance as a component of concrete. Unburnt carbon was characterised by differential thermal analysis. The greatest hazard was connected with CFA from the now destroyed Zmiivska TPS; the contents of Cd, Sn, Sb, Pb and As were 2–6 times the world coal-ash-average; maximum levels of Mo, Ga and V were also observed in Zmiivska ash. The lithium content of CFA from Zmiivska and Kryvorizka TPS, and one fraction of Prydniprovsk TPS ash (40–125 µm) exceeded world average values almost 2–3 times. In all samples, light REE (La, Ce, Pr, Nd and Sm) preponderate compared to middle REE (Eu, Gd, Tb, Dy and Y) and high REE (Ho, Er, Tm, Yb and Lu); the ratio of light to heavy REEs ranged from 18 to 32. The studied CFAs can be considered as a secondary source of REEs since critical elements comprise ≥ 30%.

## KEYWORDS:

Coal fly ash

rare-earth elements

Ukraine

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