

Research Note

## Development of a Cement Solidification Method for Melting Fly Ash Containing Zn as a Hardening Inhibitor

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• **Summary** • Combustible materials contaminated by radioactive Cs that have been released into the environment by the Fukushima Daiichi Nuclear Power Plant accident are reduced in volume by thermal treatment, and the Cs is concentrated in melting fly ash (MFA) as a water-soluble salt. Since MFA is processed at a high temperature (about 1500° C), heavy metals such as Zn and Pb are often volatilized and concentrated. These elements cause hydration inhibition in cement, hindering cement solidification of MFA. In this study, MFA was obtained from a general waste-melting facility and was found to contain Zn, Pb, P, and Cu, which inhibit cement hardening. In particular, Zn was found to be 14 mass% as ZnO, which severely impedes cement solidification when using blast furnace slag blended cement type B. Therefore, the effects of various commercially available chemical admixtures and accelerating hardening agents that may increase the strength of cement were investigated. CaCl<sub>2</sub> and semi-hydrated gypsum, which were agents at increased concentration, were also investigated and were found to be insufficient. Finally, the use of AE water reducer and sodium aluminate, a cement rapid-hardening agent, in combination with blast furnace slag blended cement type B was found to ensure flowability for pouring and molding without increasing the volume of the cement solidified body from the original MFA volume. It also achieved the compressive strength required for burial and disposal. These results indicate that cement solidification of MFA is feasible.

**Key Words:** cement solidification, melting fly ash, hardening inhibition, Zn, sodium aluminate, AE water-reducer, blast furnace slag blended cement

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