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Original

Reports of Entrusted Research and Demonstration Work for Cs Removal and Recycling Technology to Turn Radioactive Soil and Incineration Ash into Construction Materials at a Pilot Plant in Warabidaira Area, Iitate Village, Fukushima Prefecture

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Summary

This study is an entrusted verification research project for Cs removal, volume reduction and recycling technology for radioactive waste. The purpose is to recycle radioactive waste, including soil removed in Iitate Village and incineration ash generated in an incinerator, into safe construction material products at a pilot plant built next to the incinerator. A preliminary electric furnace test was carried out using various types of radioactive waste including removed soil, fluidized bed combustion fly ash, stoker bottom ash and stoker fly ash. It was found that, with any of the waste types tested, residual radioactive Cs (r-Cs) concentration could be reduced to below the clearance level of 100 Bq/kg by controlling CaO/SiO_2 to over 2.0 in weight and Cl/K to 0.8 to 1.1 in moles and heat treating the raw material at 1300 °C or above. In the verification test using the pilot plant, the raw materials using fluidized bed combustion fly ash, stoker bottom ash or removed soil achieved a yield rate of accepted product of over 95%, with residual r-Cs concentration after the heat treatment successfully reduced to below 100 Bq/kg by controlling CaO/SiO_2 of the raw materials and optimizing the heat treatment operation to minimize adhesion of molten raw materials to the kiln inner wall. Vaporized r-Cs was recovered by a bag filter and stored as byproduct. The r-Cs in the byproduct was found condensed to a concentration of 7 to 16 times higher than that in the radioactive waste materials, while the volume of the radioactive waste materials was reduced by 90.6% on average. It was also demonstrated that the r-Cs concentration of exhaust gas was below the detection limit.

Key Words: Radioactive Cs, Removed soil, Incineration ash, Products, CaO/SiO_2, Clearance level