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Comprehensive Comparison of Treatments and Disposal Methods of Radioactively Contaminated Materials by the Accident of Fukushima Daiichi Nuclear Power Station: Part II. Comparison of 5 Cases of Volume Reduction Processes for Incineration Residue

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● **Summary** ● Among the waste and removed soil contaminated by radiocesium from the Fukushima Daiichi Nuclear Power Station accident, from March 2020 incineration residue produced from temporary incinerators in the Special Decontamination Area is now being treated in volume reduction facilities, which use thermal treatment to evaporate and concentrate radiocesium. Its main product is molten slag with a limited concentration of radiation, and which is planned to be reused. Its by-product is highly radioactive fly ash, the final disposal of which is the subject of various studies. In this report, using the mass balance calculation method introduced in our previous report, we calculate and compare the mass balances and radioactivities of five treatment processes. In the standard treatment process, 380,000 m³ of incineration waste with 33,000 Bq/kg was reduced to 840 m³ of disposal waste with 16×10^6 Bq/kg, a volume reduction of 1/450, and produced 17,000 m³ of washing residue and 520,000 m³ of wastewater as lower-radioactive by-products. Returning the washing residue to the thermal treatment made its disposal unnecessary and increased the amount of disposal waste and wastewater by only 4%. Evaporation of wastewater produced 66,000 m³ of solidified salts. When higher-performance adsorbent was used, 110 m³ of disposal waste with 120×10^6 Bq/kg was produced, a volume reduction of 1/3,500. When fly ash was solidified without volume reduction, 180,000 m³ of disposal waste with 73,000 Bq/kg was produced, a volume reduction of only 1/2.1. From these results, the next report will estimate the cost of each treatment process and the disposal cost of all products and compare the economics.

Key Words: radiocesium, thermal treatment, fly ash, volume reduction, mass balance

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