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Evaluation of Radioactive Decontamination Effect for Paddy Soil Contaminated by the Fukushima Daiichi Nuclear Power Plant Accident

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Summary

The National Institute for Rural Engineering performed decontamination of radioactivity at the experimental sites in Iitate Village where paddy fields were contaminated by the Fukushima Daiichi nuclear power plant accident in March 2011 by means of three methods as follows; (1) topsoil removal using soil hardener, (2) removal of soil after paddling with water draining suspended contaminated soil by pumping without manual assistance, and (3) removal of soil after paddling with water draining suspended contaminated soil by pumping with manual assistance. The three methods were evaluated using decontamination factors (DFs) that were determined by applying a variant of inverse analysis using the calculation system for the estimation of decontamination effects (CDE). Input data were provided by surveys using a low-level balloon and a radio-controlled helicopter. The DF values of the three methods were determined on the basis of the Euclidean distances between the simulated and measured dose rates after decontamination. The resulting DFs were > 60 for topsoil removal using soil hardener, 1.4 for slurry pumping, and 2.2 for manually assisted slurry pumping. The area decontaminated by the soil hardening method may have been fully decontaminated, because the distribution of measured dose rates was consistent with the distribution of dose rates calculated for a fully decontaminated area within 20 m in radius.

Key Words: Radioactive contamination, Paddy soil, Decontamination factor, Gamma ray spectrometry, CDE, Euclidean distances