

Review

Efficacies of Radioactive Decontamination Methods Conducted by the Government of a Municipality of Chiba Prefecture

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Summary

A large amount of radioactive materials were discharged from Fukushima Dai-ichi Nuclear Power Plant in March 2011, and this caused a serious radioactive contamination over large area of eastern Japan. This paper is designed to review the efficacies of decontamination methods that were conducted by the government of a municipality of Chiba Prefecture to eliminate radioactive materials. The efficacies of each decontamination methods were evaluated by reduction of air dose rate (1 cm dose equivalent dose) observed before and after decontamination (the natural air dose rate of 0.04 $\mu\text{Sv/h}$ derived from the ground was subtracted for the calculation of reduction rate). Following seven decontamination methods are cited from our past reports. 1) Coverage of ground with uncontaminated soil to thickness of 5 cm. 2) The topsoil was stripped and removed to the depth of 5 cm (exceptionally 1 cm at Japanese Garden). 3) Stripped and removed the topsoil containing radioactive materials in the range of 3 ~ 5 cm depth, subsequently coverage with uncontaminated soil to the thickness of 3 cm to the subsoil layer. 4) Replacement with uncontaminated sand 15 ~ 20 cm depth in sandbox. 5) Washing the paved road with high-pressure water jet washer (water pressure of 15 MPa, the rate of water usage was approximately 20 L/m²). 6) Replacement of contaminated sand at the artificial turf tennis court. 7) Lawns were mowed at 2 cm length. The observed air dose reduction rates were 57%, 64% (31% at Japanese Garden), 75%, 65 ~ 74%, 33%, 67% and 70% respectively. A point to notice is that, radioactive materials are known to transfer among environmental media by weathering effects (e.g. wind, precipitation) that may act as either increase or decrease of air dose rate. Therefore, great attention should be paid to the monitoring of air dose rate even after the decontamination was achieved.

Key Words: Decontamination, Chiba Prefecture, Fukushima Dai-ichi Nuclear Power Plant, Air dose reduction rate, Monitoring
