

Evaluation of the Efficacy of Decontamination Method Examined at Artificial Turf Tennis Court Located in Chiba Prefectural Kashiwa-no-ha Park

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Summary

Decontamination to eliminate radioactive materials (especially cesium-134 and 137) derived from the Fukushima Daiichi Nuclear Power Plant accident has been accomplished at various contaminated areas. This study evaluates the decontamination method that was conducted at the sand covering the artificial turf tennis court located in Kashiwa-no-ha Park. We used the measurement of the 1 cm dose equivalent rate ($\mu\text{Sv/h}$) and the concentration of radioactive cesium in the sand (Bq/kg) to determine the efficacy of this method. The sand on the tennis court that was contaminated with radioactive cesium on the tennis court was totally removed with a special vacuum machine. At the height of 50 cm we had a 52 % decrease from 0.27 $\mu\text{Sv/h}$ to 0.13 $\mu\text{Sv/h}$ and at 1 m above the ground we had a 46 % decrease from 0.26 $\mu\text{Sv/h}$ to 0.14 $\mu\text{Sv/h}$. As a subsequent step, uncontaminated new sand was placed uniformly over the surface of the tennis court, which functioned as a shield of gamma ray radiated from persistence radioactive materials on the artificial turf. With the shielding our readings at 50 cm showed an additional 31 % decrease from 0.13 $\mu\text{Sv/h}$ to 0.09 $\mu\text{Sv/h}$ and at 1 m a 36 % decrease from 0.14 $\mu\text{Sv/h}$ to 0.09 $\mu\text{Sv/h}$. The overall decontamination results showed a decrease of 67 % from 0.27 $\mu\text{Sv/h}$ to 0.09 $\mu\text{Sv/h}$ and 65 % from 0.26 $\mu\text{Sv/h}$ to 0.09 $\mu\text{Sv/h}$ at the height of 50 cm and 1 m above the ground, respectively. The measurement value of 1 cm dose equivalent rate after decontamination procedure showed a decrease below 0.19 $\mu\text{Sv/h}$ (natural background radiation dosage 0.04 $\mu\text{Sv/h}$ is subtracted) from the over the entire site. The result of this study indicates that decontamination method performed at this artificial turf tennis court showed significant efficacy.

Key Words: Chiba prefecture, tennis court, decontamination, dose equivalent rate, radioactive cesium