

千葉県立手賀沼親水広場で実施した除染効果の検証

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Evaluation of the Efficacy of Decontamination Methods Examined at Chiba Prefectural Teganuma Aquatic Park

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Summary

Decontamination of radioactive materials (especially cesium-134 and 137) derived from Fukushima Daiichi Nuclear Power Plant accident has been fulfilled at contaminated regions. This study evaluates the efficacy of decontamination methods with the measurement of air dose rate and concentration of radioactive cesium in the ground before and after decontamination at Chiba Prefectural Teganuma Aquatic Park. Among 101 measurement sites, lawn sites and road paved with urethane foam sites showed relatively high air dose rates that were above 0.23 $\mu\text{Sv/h}$ (the natural air dose rate of 0.04 $\mu\text{Sv/h}$ derived from the ground is included). From the quantitative analysis of lawn sample by germanium detector, we confirmed that thatch (surface layer of lawn with dense accumulation of death and living grass) showed higher activity of radioactive cesium compared to the soil under the thatch, implying thatch have capability to retain radioactive cesium. Examined decontamination methods were: 1) Mowing lawns at the depth of 2 cm from the ground level (removes thatch). 2) The urethane foam was stripped and removed to the depth of 10 mm. The observed range (average) of air dose reduction rate at the height of 50 cm and 1 m above the ground at lawn sites were 8 ~ 53 % (34 %), 27 ~ 63 % (46 %), respectively. Also for road paved with urethane foam sites were 53 ~ 63 % (57 %), 43 ~ 56 % (48 %), respectively. The measurement value of air dose rate after decontamination procedure showed a decrease below 0.23 $\mu\text{Sv/h}$ at all of the measurement sites. Removing thatch is an effective decontamination method, but it should be noted that mowing depth is a crucial part, and we suggest during the decontamination process of removing thatch, the efficacy should be confirmed by monitoring air dose rate at the same time.

Key Words: Chiba Prefecture, Park, Decontamination, Fukushima Daiichi Nuclear Power Plant accident, Radioactive cesium

和 文 要 約

千葉県立手賀沼親水広場において、除染前後の線量率等の詳細な測定・解析を実施し、汚染実態の把握に併せて除染効果の検証を行った。除染前調査で、地表面が芝生またはウレタンである箇所では0.23 $\mu\text{Sv/h}$ を超過する調査地点が多く見受けられた。また芝生においては、芝生の刈りかすや枯れた芝生の堆積物(サッチ)にその下に位置する土壌よりも放射性物質が多く蓄積していることが確認された。除染作業として、芝の深刈り(地表面から2 cm 深さ)と遊歩道のウレタン舗装の削り取り(厚さ10 mm)が行われた。芝の深刈りによる地上から高さ50 cm、1 mの線量率の低減の範囲(平均)はそれぞれ、8 ~ 53 % (34 %), 27 ~ 63 % (46 %)であった。ウレタン削り取りによる地上から高さ50 cm、1 mの線量率の低減の範囲(平均)はそれぞれ53 ~ 63 % (57 %), 43 ~ 56 % (48 %)であった。除染後に実施した調査では、すべての除染対象区域内の調査地点で線量率が0.23 $\mu\text{Sv/h}$ 未満であった。芝の深刈りによってサッチを取り除くことで、ある程度の除染効果が得られることは確かだが、深刈りの深度が足りないと効果が不十分となる可能性があるため、芝の深刈りを実施する際は、随時線量率を測定し低減の有無を確認しながら作業の進め方や深度を配慮する必要がある。