

Estimation of total released ^{134}Cs and ^{137}Cs derived from TEPCO-FNPP1 accident into the North Pacific Ocean by

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The oceanic distribution of ^{134}Cs and ^{137}Cs released from the Tokyo Electric Power Company-Fukushima Daiichi Nuclear Power Plant (TEPCO-FNPP1) accident were investigated by using the optimal interpolation (OI) analysis. In this study, we conducted the OI analysis during the period from the end of March to the end of May 2011. A data set reported in research papers and documents was used for the analysis.

During the end of March to early April, extremely high ^{134}Cs and ^{137}Cs activities in seawater occurred along the coast near the TEPCO-FNPP1. The high activities spread to the region of 165°E with a latitudinal center of 40°N in the western North Pacific Ocean. Atmospheric deposition is also cause to high activities in the region between 180° and 130°W in the North Pacific Ocean. The total inventory of FNPP1-released ^{134}Cs in the North Pacific Ocean is estimated to be 15.2 ± 1.8 PBq. In these, about half (8.3 ± 1.8 PBq) of the total released amount is concentrated in the coastal region near the TEPCO-FNPP1. Considering that the direct released ^{137}Cs in the seawater was 3.5 ± 0.7 PBq (Tsumune et al., 2012), atmospheric deposition contribute to the ^{134}Cs inventory in the near the TEPCO-FNPP1. The FNPP1-released ^{134}Cs inventory in the coastal region decreased exponentially with half-time of 4.2 ± 0.5 days after cease of the direct discharge (6 April 2011) and become to about 2 ± 0.4 PBq at the middle of May 2011. Considering that the $^{134}\text{Cs}/^{137}\text{Cs}$ activity ratios for the FNPP1 accident were very close to one and extremely uniform during the first month, the total amount of ^{137}Cs released by the TEPCO-FNPP1 accident reached to 20% of a current North Pacific inventory of bomb-derived ^{137}Cs injected in the 1950s and early 1960s.

Keywords: TEPCO-FNPP1, ^{134}Cs , ^{137}Cs , North Pacific Ocean, Optimal Interpolation analysis, Inventory