Distributions of tritium in the marine water and biota around Rokkasho Reprocessing Plant

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For decommissioning of Fukushima Daiichi Nuclear Power Station (FDNPS), it is one of the biggest problems to treat the radioactive contaminated stagnant water in the building. It is difficult to remove H-3 from the contaminated water by only Advanced Liquid Processing System (ALPS) treatment. Thus, the Japanese Government announced to release the ALPS treated water containing H-3. To predict the alteration of the dose rate of the marine biota by the change of H-3 concentration in marine water after the release of ALPS water, it is necessary to understand the dynamics of H-3 in marine ecosystem. In this study, we studied the behavior of H-3 in the marine environment (water and biota) off Aomori and Iwate prefectures from FY2003 to FY2012, as the background data of the Pacific Ocean along the coast of the North East Japan. To clarify the dynamics of H-3 in marine biota, we compared H-3 and Cs-137. Excluding the period of the intermittent test operation of the Rokkasho Reprocessing Plant (FY2006-FY2008), the concentration of H-3 in seawater, tissue free water tritium (TFWT) and organically bound tritium (OBT) were 0.052-0.20 Bq/L with a mean of 0.12±0.031 Bq/L, 0.050-0.34 Bq/kg-wet with a mean of 1.1±0.039 Bq/kg-wet and 0.0070-0.099 Bq/kg-wet with a mean of 0.042±0.019 Bq/kg-wet, respectively. Before the FDNPS accident (FY2003-FY2010), Cs-137 concentration in seawater and marine biota were 0.00054-0.0027 Bq/L with a mean of 0.0016±0.00041 Bq/L and 0.022-1.8 Bq/kg-wet with a mean of 0.090±0.037 Bq/kg-wet, respectively. Concentration Ratio (CR), the ratio of the concentration of marine biota and seawater for TFWT, was to be 0.34-2.37 with a mean of 0.97±0.31 in all spices, meaning the concentration of marine biota was almost equal to seawater. For Cs-137, CR were 46-78 with a mean of 56±22. We compared CRs for TFWT of Gadus macrocephalus, Lophius litulon and Oncorhynchus keta with those of Cs-137. Comparing CR-TFWT and CR-Cs-137 for these three species, Spearman-R was <0.4 and p was >0.05, indicating that the dynamics of TFWT and Cs-137 in marine ecology is decoupled.