Effects of Radiocesium Released from the Fukushima Dai-ichi Nuclear Power Plant Accident on Aquatic Environment Around Onahama, Japan

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A large quantity of radioactive materials was released into atmosphere by Fukushima Dai-ichi Nuclear Power Plant accident caused by the East Japan Great Earthquake disaster on 11 March 2011. Some parts of radiocesium have been deposited on the land area of Fukushima Prefecture, Japan, and have been transported to the ocean through river systems. Therefore, it is important to study a long-term impact of radiocesium on river basin and coast marine environments. This study reports the monitoring results of radiocesium activity in river waters from the two river systems (Natsui and Same Rivers) and in seawater at Onahama Bay from July 2011 to October 2016. Dissolved Cs in the river waters was collected with ammonium molybdophosphate (AMP)/Cs compound. The radioactivity was measured for the dried AMP and suspended solid samples by using gamma-ray spectrometry with low background Ge detectors equipped with a multichannel analyzer during 1 to 3 days. Decay correction of radioactivity for ^{134}Cs and ^{137}Cs was carried out at each sampling date.

Total (dissolved + particulate phases) radiocesium activity has been decreased with increasing time after the accident, though the higher radioactivity was observed after the rainy events. The radioactivity of ^{134}Cs and ^{137}Cs was 0.37 to 284 mBq/kg and 1.5 to 894 mBq/kg, respectively. The percentage of particulate ^{137}Cs to total ranged from 11 % to 98 %. There is a good positive correlation between particulate of ^{137}Cs and turbidity. These results suggest that a particulate phase of ^{137}Cs is major existent forms and is related to the variation of total radioactivity fluctuation in the Natsui River. The Same River shows almost similar temporal variation. The coastal seawaters also exhibited a decrease of ^{137}Cs radioactivity with time after the accident from 192 to 6.5 mBq/kg.