Water quality management, water and sediment pollution, land based sources, hazardous wastes, algal blooms, bio- indicators of pollution and monitoring, pollution control

Radioactive Cesium Pollution Of Tokyo Bay Sediment

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FDNPS suffered serious damage in the massive tsunami by the Tohoku-Pacific Ocean Earthquake on March 11, 2011. A large amount of radioactive fission products were released to atmosphere. The radiocesium (Cs134 and Cs137) was precipitated onto ground by rainfall, and adsorbed in the soil. The metropolitan area and the Kanto district received the serious radioactive pollution by the radiocesium. Tokyo Bay is an enclosed inner bay in the southern Kanto district. The sediment of Tokyo Bay received radioactive contamination mainly through river discharge. In order to clarify the behavior of the radioactive nuclides released from FDNPS in the metropolitan area, the spatial and temporal distribution of the radiocesium in the sediment of Tokyo Bay was investigated. The surface sediments were collected using an Ekman-Birge sampler, and were homogenized to a 5 cm depth from the seabed. The sediment cores were obtained by scuba diver using an acrylic corer. The core samples were sliced at an adequate thickness. The sediment samples were dried to a constant weight, then pulverized and packed into a plastic container to measure radioactivity. The radiocesium was determined by gamma-ray spectrometry using an HPGe detector. The total radioactivity of radiocesium detected in the surface sediment of Tokyo Bay ranged from 240 to 870 Bq/kg-dry in the estuary of Arakawa River, but the activities in other areas were about 90 Bq/kg or less. The results suggested that radiocesium which precipitated to the ground, was carried to the estuary with adsorption on the soil particles. The vertical distribution of radiocesium showed a high activity in the deep layer than surface and it invaded deeper than estimated based on the accumulation rate of the sediment. The maximum radioactivity was 2100 Bq/kg at the 15cm depth layer. It was described that the vertical distribution of radiocesium was affected by physical mixing of sediments by tidal current, flood, and bioturbation of benthos. The smaller particle showed high radioactivity. There was good correlation at the concentration of the radiocesium and the particle size of the sediment. This result indicates that the radiocesium has adsorbed to the fine particles such as clay minerals in the soil.