Abstract

We have developed an advanced environmental transfer and dose assessment model 1.0 (AdvETDAM 1.0) for radionuclides (^{3}H, ^{129}I, ^{14}C etc.) discharged from the first Japanese commercial nuclear fuel reprocessing plant located in Rokkasho. The computer code system was developed on a PC to describe atmospheric dispersion, terrestrial and aquatic transfers, and dose calculations of the radionuclides. The aquatic transfer model of the radionuclides targeted Lake Obuchi, which is a brackish lake neighboring the reprocessing plant. Futamata River flows into the lake, and provides most of fresh water to the lake. The lake is also connected through Obuchi Fishing Port at the mouth of the lake to the Pacific Ocean. The radionuclides are introduced into the lake through three routes: atmospheric deposition on the lake surface, inflow from the catchment area through Futamata River, and inflow from the Pacific Ocean. The radionuclide concentration in Futamata River water was simulated by a radionuclides transfer model for the catchment area of the river. Since the radioactive waste water is discharged to the coast of Rokkasho, the concentration of the radionuclides in seawater at the Obuchi Fishing Port was estimated by a radionuclide transfer model for the Rokkasho Coast. The Lake Obuchi model consists of a water current model and an ecosystem model including aquatic organisms. This paper introduces an overview of the Lake Obuchi model and the handling methods of parameters related to the radioiodine (^{129}I) in the ecosystem model. Concentrations of ^{129}I in lake water and biological samples collected from Lake Obuchi in 2008, which were higher than the background level, were simulated by using AdvETDAM 1.0 to confirm its function.