Radiocontamination of hydrobionts within the Chernobyl accident Exclusion Zone

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The territory of the Chernobyl accident Exclusion Zone is characterised by significant heterogeneity of radionuclide contamination, which is significantly reflected by the radioactive substance contents in aquatic ecosystem components. Primarily this is due to the composition and the dynamics of radionuclide emissions into the environment as a result of accident in 1986 as well as to the subsequent processes of radioactive substances transformation and their biogeochemical migration in aquatic ecosystems. Our studies were conducted to identify dynamics of Sr-90, Cs-137, Pu-238, 239, 240 and Am-241 in components of freshwater biocenose and to assess the major factors, which determine radionuclide accumulation and internal absorbed dose rate in hydrobionts. The construction of flood protection dams on the most contaminated areas of the Exclusion Zone to prevent washing away of radioactive substances from soils was by the reason of strengthening of overmoistening and swamping processes within embankment territories. As a result - on a background of the common tendencies of increase of the mobile forms of radionuclides in soils of catchment territories and bottom sediments of the Exclusion Zone, there is an increase of the water-soluble forms of Sr-90 in waterlogged soils of flood-lands. Thus the increase of concentrations of the mobile radionuclide forms and their inclusion into biotic circulation of aquatic ecosystems is observed. Our studies during 1993-2007 have shown that since the late 1990-s the higher aquatic plants and fish related to different ecological groups is indicating a frank tendency to Sr-90 content increase in tissues. The specific activity of Cs-137 either decreases or remains practically constant. Hence, in the middle 1990-s specific activity of Cs-137 in tissues of aquatic biota was much higher than specific activity of Sr-90 in them, whereas in the late 1990-s these values became comparable, and at present specific activity of Sr-90 greatly exceeded of Cs-137 content. Such dynamics of Sr-90 contents is significantly reflected on dose rate for hydrobionts due to incorporated radionuclides. At rather stable internal absorbed dose rate, caused by Cs-137 the dose, caused by the Sr-90 content, has grown more than in 20 times for some species of higher aquatic plants and fish in comparison with the beginning of 1990-s. As a result the total internal dose of plants and fish irradiation has increased more than in 6 times, that testifies to essential deterioration of radiating conditions for aquatic biota within the Chernobyl accident Exclusion Zone.

Article published by EDP Sciences and available at http://www.radioprotection.org or http://dx.doi.org/10.1051/radiopro:2008701