ASSESSMENT OF EFFECTIVE DOSES DUE TO INHALATION OF NATURAL RADIOACTIVITY IN THE DUST OF URBAN ENVIRONMENT

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The inhalation exposure to dust in the urban environment for adult and child is very important due to health issues. The radionuclides Ra-226 and Th-232 were measured in the samples of urban surface deposited sediments. The average concentrations of Ra-226 and Th-232 in dust are 20.8 and 15.3 Bq kg⁻¹, respectively (1). The effective dose is estimated depending on the daily activity and air dust concentration for the adult and child. The results show that the total effective dose received during 70 years by adult without outdoor activity is 0.74 μSv under exposure to air dust concentration 10⁻⁴ g/m³, which is typical for the city of Ekaterinburg. Critical scenario of exposure of an adult person to radioactive material in particulate matter in the air including such daily activities as training, bicycle driving and work in urban environment results in the total effective dose 17.8 μSv during 70 years at air dust concentration equal to the diurnal Maximum Permissible Limit (1.5 10⁻⁴ g/m³). Also, the critical children group can be exposed to radionuclides by inhalation through daily outdoor games, sport activity, training, bicycle etc (8 hours daily during vacation, 4 hours daily during school time, 2000 hours per year from 7 years to 17 years). The total effective dose for critical children group is 2.9 μSv. Thus, the effective doses due to inhalation of natural radioactivity in the dust in city of Ekaterinburg are relatively low in comparison ICRP reference level.

1. Hanfi, M.Y., Yarmoshenko, I.V., Seleznev, A.A. et al. J Radioanal Nucl Chem (2019) 321: 831. <https://doi.org/10.1007/s10967-019-06657-9>