

RADIOACTIVITY ESTIMATION METHODS FOR POTABLE WATER

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There is a review of radioactivity dose calculation and quality estimation methods for potable water. The international approach to drinking water radioactivity has tended to focus on one or two selected radioactive nuclides in water, and has not offered much guidance in terms of total dose evaluation for all the common natural radionuclides present in water samples. We have considered the annual radiological dose for a person drinking water that contains a certain level of radioactivity is calculated by simple equation. We have considered chronic exposure situations, behavior of naturally occurring nuclides in the environment, typical water quality criteria, international drinking water radioactivity concentrations, dose calculation methods. The procedure of a control of a radiation safety of potable water is considered. The method of control is based on measuring specific alpha- and beta activities.

In some cases it may be necessary to evaluate a water resource by considering the most sensitive age group. This is the age group for which the lifetime dose committed during a specific year is the highest. The following approach is followed for determining water quality:

- Calculate dose to individual age groups,
- If the difference between the minimum and maximum of these doses is less than a factor of five, calculate the weighted life-time average dose and use it for classification purposes.
- If the difference between the minimum and maximum of these doses is more than a factor of five, use the maximum dose age specific dose for initial classification purposes.

The establishment of local control levels for the given water source is recommended at

realization of an option $\sum \frac{A_i}{SL_i} + \sqrt{\sum \left(\frac{\Delta A_i}{SL_i} \right)^2} \leq 1$ for the further monitoring potable water: where: A_i is a specific activity of radionuclide measured in water (including of ^{222}Rn); ΔA_i is an absolute error of measuring of a specific activity of radionuclide; SL is a safety level of radionuclides concentration in potable water. These levels are measured on a common alpha activity and-or the beta- activity guaranteeing not overflow of a level of a dose 0,1 Sv/year. At non-compliance with this option there is necessary further research water for the purpose determinations of annual inflow of radionuclides:

1) Measuring should characterize quality of water during all year. For underground water it is research not less than 4 samples water in a year, selected in each season; for the surface water it is not less than 12 samples water in a year, selected monthly.

2) Analyses should point quality of the water really consumed by the population. At availability of a water treatment or mixing of water of different water supply points, the radiation control is carried out before its feeding in a water-supply line, and for some radionuclides (gaseous or with a small half-life, for example, ^{222}Rn) radiation control is carried out in points of a distributive water-supply.