

Natural radioactivity as an impact factor in drinking water quality

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ABSTRACT

This study has evaluated the levels of natural radionuclides in spring water and drilled water, which are used as potable water reservoirs and samples from the local water supply network, in the island of Ikaria in the Aegean Sea and potable spring water in Loutraki in the Korinthiakos Gulf, Greece. The activity concentrations of ^{226}Ra and ^{222}Rn were in the range of $<0.1\text{--}0.7\text{ Bq l}^{-1}$ and $<0.1\text{--}114\text{ Bq l}^{-1}$, respectively. The radiological impact on the habitants, due to consumption of drinking water, was calculated taking into account the annual intake, through ingestion, of ^{226}Ra and ^{222}Rn . In order to estimate the radiological impact from ^{222}Rn inhalation, due to its release from water, the mean contribution of the waterborne ^{222}Rn to the indoor air concentrations was evaluated on the basis of the transfer coefficient of 10^{-4} from water to air. The effective dose equivalents due to ^{226}Ra ingestion were in the range of $25\text{--}175\text{ }\mu\text{Sv y}^{-1}$, with the maxima reaching the recommended limit of $100\text{ }\mu\text{Sv y}^{-1}$. The effective dose equivalents due to ^{222}Rn ingestion were in the range of $0.1\text{--}114\text{ }\mu\text{Sv y}^{-1}$. For both radionuclides, the highest doses were corresponding to the ingestion of potable spring water, compared to the drilled and tap water. The resulting effective dose equivalent from the inhalation of the waterborne ^{222}Rn , in equilibrium with its daughters, was in the range of $0.36\text{--}85\text{ }\mu\text{Sv y}^{-1}$. According to our results, the ingestion of ^{226}Ra presents the higher impact factor of natural radioactivity in drinking water of the studied areas and appropriated remedies should be taken.

Keywords: Natural radioactivity; Drinking water; ^{226}Ra ; ^{222}Rn ; Dose rate

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