

Radiological impact of surface water and sediment near uranium mining sites

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Abstract

The aim of this study is to assess the radiological impact of surface water and sediment around uranium mining sites 20 years after their closing. The areas under observations are 31 former classical underground uranium mining and exploratory sites in Bulgaria, named as objects. The extraction and processing of uranium ores in the Republic of Bulgaria were ended in 1992. To assess the radiological impact of radionuclides field expeditions were performed to sample water and bottom sediment. The migration of uranium through surface water was examined as one of the major pathways for contamination spread. The range of uranium concentration in water flowing from the mining sites was from 0.012 to 6.8 mgU l⁻¹ with a geometric mean of 0.192 mgU l⁻¹. The uranium concentrations in water downstream the mining sites were approximately 3 times higher than the background value (upstream). The concentrations of U_{nat}, ²²⁶Ra, ²¹⁰Pb, and ²³²Th in the sediment of downstream river were higher than those upstream by 3.4, 2.6, 2, and 1.7 times, respectively. The distribution coefficient of uranium reflects its high mobility in most of the sites. In order to evaluate the impact on people as well as site prioritization for more detailed assessment and water management, screening dose assessments were done.

Keywords: uranium in water, radionuclide in sediment, uranium distribution coefficient

(Some figures may appear in colour only in the online journal)