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INTERNATIONAL CONFERENCE ON RADIATION IN VARIOUS FIELDS OF RESEARCH

Summer Edition

July 25-29, 2022
Palmon Bay Hotel
Herceg Novi, Montenegro

BOOK OF ABSTRACTS

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Level of ^{90}Sr in sediments of the Danube River at the border profile Serbia-Hungary

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https://doi.org/10.21175/rad.sum.abstr.book.2022.27.4

The radioactive fission product ^{90}Sr has a sufficient half-life time (28.8 y) to be detected for a long time after it appeared in the environment. This radionuclide emits a β-particle of 546 keV, giving progeny to ^{90}Y, also a β-emitter ($T_{1/2}$ = 64.2 h, 2.28 MeV), with which it reaches secular activity equilibrium for a 14 days. Due to properties, radiostrontium may be considered as a highly hazardous anthropogenic radionuclide. The worldwide presence of ^{90}Sr has been caused intentionally or accidentally in the period between 1950 and 1970, as a consequence of various human nuclear activities. The ^{90}Sr determination is an important part of the annual plan of the radioactivity survey in environmental samples such as soil, sediment, grass, milk, wheat, foodstuff (especially vegetables).

A potential contaminant of the Danube River ecosystem (in a radioactive sense) is the Paks Nuclear Power Plant, located in Hungary, 85 km from the Serbian-Hungarian border. Hence, this paper has been given insight to the results of investigation of ^{90}Sr content in sediment of the Danube River at border profile between Serbia and Hungary. Sediment samples were collected a few times of year at Serbian side of the Danube River (left coast) in Bezdan. Within the mentioned ecosystem sampling was classified into four zones (sampling points), the first at 1425.5 km river flow, the second at 1426.3 km river flow, the third at 1427.2 km river flow and the fourth at 1428 km river flow. In the each zone one sample is collected. The preparation and analysis of collected samples were performed in Laboratory for Radiation Measurements of the Vinča Institute for Nuclear Sciences. The study covered a period of six years from 2016 to 2021. The level of activity of radionuclide of interest was determined by the radiochemical analytical method of ^{90}Sr determination via its short-lived daughter ^{90}Y. The samples after applied radiochemical procedure were counted by low-level gas proportional counter Thermo Eberline FHT 770T (ESM Eberline Instruments GmbH, Erlangen, Germany). The counting time was 5400 s. The counting efficiency of this counter was 35 % for the β-particle of ^{90}Y.

The measured values of ^{90}Sr activity concentration in sediment samples of the Danube River were ranged between 0.18 Bq/kg and 0.79 Bq/kg for dry matter, depending on the sampling season or sampling point. The values of ^{90}Sr activity concentration in investigated samples were far below level before starting work of the Paks Nuclear Power Plant (7.1 Bq/kg of dry matter). Evaluation of the accuracy of the applied method was confirmed using reference material and interlaboratory comparison samples. The results of this study were compared to the values available from the literature and the comparison confirmed that no significant contamination of investigated ecosystem in terms of the content of anthropogenic radionuclide ^{90}Sr. The conducted study points out the importance of systematic testing of the content of anthropogenic radionuclide ^{90}Sr in sediments as an important element in the system of control and testing of environmental safety.