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Polonium (^{210}Po), uranium (^{234}U , ^{238}U) and plutonium (^{238}Pu , $^{239+240}\text{Pu}$) in the biggest Polish rivers

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Radionuclides existing in the environment, both natural and artificial, are accumulated in plants and animals and transferred through the trophic chain. They are also transported with river from their catchments' areas. The activities of polonium ^{210}Po , uranium (^{234}U , ^{238}U) and plutonium (^{238}Pu , $^{239+240}\text{Pu}$) were measured in the biggest Polish rivers with tributaries –the Vistula and the Oder –and 3 small Pomeranian rivers. The Vistula unfiltered water samples were collected from November 2002 to November 2003, the Oder and the Pomeranian samples were collected from October 2003 to July 2004 and all were measured using the α spectrometer.

The highest quantity of ^{210}Po was transported from the Vistula catchments area to the Baltic Sea in spring and the lowest in summer, while the Oder carries the highest amounts during spring time. Annually the southern Baltic Sea is enriched in 94.5 GBq of ^{210}Po (73.7 GBq from the Vistula, 14.8 GBq from the Oder and 6.0 GBq from the Pomeranian rivers).

In the study, the highest activities of uranium ^{234}U and ^{238}U in the Vistula River samples was observed in spring, the lowest in summer. The activity of uranium in the Oder was different in all analyzed seasons, the lowest however in summer. In all analyzed river samples uranium isotopes ^{234}U and ^{238}U are not in the radioactive equilibrium state and the values of $^{234}\text{U}/^{238}\text{U}$ activity ratio lie between 1.03-1.84. Annually the southern Baltic Sea is enriched in about 750 GBq of ^{234}U and ^{238}U from all analyzed rivers.

According to the Vistula River the highest quantity of plutonium ^{238}Pu and $^{239+240}\text{Pu}$ were transported to Baltic Sea in spring and the lowest in summer. The highest activities of plutonium ^{238}Pu and $^{239+240}\text{Pu}$ in the Oder River samples was observed in winter, the lowest in summer. Annually the Vistula River, the Oder River and the Pomeranian rivers enrich the Baltic Sea in 22.2 MBq ^{238}Pu and 137.6 $^{239+240}\text{Pu}$.

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Primary author: Dr STRUMIŃSKA-PARULSKA, Dagmara (University of Gdańsk)

Co-authors: Mrs TUSZKOWSKA, Agnieszka (University of Gdańsk); Dr BORYŁO, Alicja (University of Gdańsk); Dr JAHNZ-BIELAWSKA, Anna (University of Gdańsk); Prof. SKWARZEC, Bogdan (University of Gdańsk)

Presenter: Dr STRUMIŃSKA-PARULSKA, Dagmara (University of Gdańsk)

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