

Natural occurrence of tritium in the ecosystem of the Yenisei River

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In the Krasnoyarsk region there is a Mining and Chemical Combine (MCC) of the Rosatom, which has been operating for more than fifty years producing weapon-grade plutonium. Since 2001 the monitoring of tritium content in the Yenisei River water has been carried out to estimate the role of MCC in the radiation influence on the ecosystem of one of the most full-flowing rivers in Russia.

It was established that the river waters close to the industrial zones of MCC contain tritium in the concentrations of 50-200 Bq/L, which are 10-40 times higher than the background values for the River Yenisei. The tritium content in the water of the river Bolshaya Tel, the right tributary of the river Yenisei, amounts to ~50 Bq/L near 1 km upstream. To specify the nature of the tritium discharged into the river Bolshaya Tel, the tritium content in the river sediment layers was determined. It was found that besides tritium (~59 Bq/L), whose content was higher than that in the water layer close to the river sediment (~15 Bq/L), ^{14}C (~14 Bq/L) was present.

The monitoring of tritium content in water plants sampled both in control areas and in the influence zone of the MCC has been done since 2003. It has been found that the total tritium content in some plant species may amount to ~300 Bq/kg, the fraction of OBT being 15 %.

The widely spread species of the submerged macrophyte of the River Yenisei - *Elodea Canadensis* - was used in the investigations. To study the accumulation processes, the tritium content of 1000 Bq/L in the water was used. The tritium content in the initial plant sample was ~14 Bq/L of the biological liquid. After 10 days the tritium content in the plants increased by 50 % and the tritium fraction as OBT increased from 0.3 % to 8 % of the total tritium content in the plants. In simulation experiments, at the content HTO of 2900 Bq/L the plants died after 29 days.