

Research and development of environmental tritium modeling

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Assessment of environmental impact of tritium release from nuclear facilities is a topic of interest in many countries. In the IAEA's EMRAS (Environmental Modelling for Radiation Safety) special program, there have been done progresses for routine releases and in the present a dedicated working group (WG 7 – “Tritium” Accidents) from EMRAS is focused on the potential accidental releases (liquid and atmospheric pathways). This working group tries to develop more robust models in international cooperation. For this purpose, the processes involved in the tritium transfer in the environment are analyzed in strong correlation with the environmental conditions, season and time of the day and /or night. A briefing of actual progresses in this working group will be presented. Romania, having CANDU reactors, is interested in both liquid and atmospheric accidental release consequences. An application of our updated aquatic model to Danube case will be described, as well as a discussion on selective uptake of dissolved organic tritium by aquatic invertebrates. Concerning the transfer of tritium in farm animals, we expand our model to growing ruminants and birds and selected examples will be presented. For atmospheric releases, in the first days, tritium dynamics strongly depend on the environmental characteristics, therefore a simple compartment model might not be appropriate for the dynamics in agricultural crops. Considering the crop genotype parameters and the growth processes, many of tritium transfer rate can be deduced. Tritium, in the organically bound form, is linked with carbon processes in plant. ¹⁴C experimental data in rice and wheat will be used in order to test sub models on dry matter production and partition to plants' parts. This will be used to model translocation of OBT from leaves to edible plant parts. Further needs of process understanding and experimental efforts will be noted.