

The Role of Organically Bound Tritium after Ingestion in Normal and Accidental Scenarios in Inertial Fusion Reactors

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In the future design of Inertial Fusion Reactors (IFE), the potential environment contamination by tritium emissions to the atmosphere could be relevant when considering ingestion by tritiated foods. In this case, the most important chemical forms of tritium, elemental tritium (HT) and tritiated water (HTO) derive in special form of tritium: Organically Bound Tritium (OBT). The behavior of tritium after chronic or accidental releases is that of being deposited on soil and vegetation via dry and wet deposition processes during pass of the tritiated plume or due to being re-emitted to the atmosphere in form of HTO (from HT form) to the air. Depending on the different types of soil, the tritium incorporates to the soil water and it is absorbed to subwater, roots of plants and drinking of animals. These processes are now considered in our calculations with more precise calculations and first conclusions of their real significance, and those conclusions will be exposed and explain in this work. The role of HT versus HTO and importance of re-emission process will be remarked.

In early time, one week after the emission, the contribution to the Effective Dose Equivalent is mainly due to both forms HT and HTO, but at long time, the OBT contributes at total doses by ingestion more than HT or HTO. New updated consequences appear in this continuous uptake of tritium after that secondary phase because OBT forms live for a long time in the human body. Those conclusions and the diffusion process is study and analyzed in this paper.