

Tritium dose evaluation for professionally exposed workers at Cernavoda NPP

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Because of the physical and chemical nature of operations at a CANDU plant, the production of tritium in the presence of organic matter typically does not occur. ³H intakes as tritiated water (HTO) are the main concern for internal dosimetry of professionally exposed workers in a CANDU plant.

Direct dose method for intakes of tritiated water is used at Cernavoda NPPP. Tritium is considered to be in equilibrium with body water and routine tritium dosimetry is accomplished using periodic urine concentration assessment. Based on continuous 13 years monitoring data significant cases of internal tritium contamination were identified and analyzed. The level of chronic exposure was estimated for each exposure type.

ICRP models are used to estimate tritium doses at Cernavoda NPP. It has been established that tritium in the form of HTO passes through the body quite rapidly, behaving similarly to other water molecules Tritium is fairly uniformly distributed in the body and that the retention can be described as a sum of 2–3 exponential terms. ICRP (ICRP 1989) recommends a two-compartment model to describe both HTO and OBT separately. These model represent two independent compartments with no allowance for modeling the internal transfer of tritium from a free state to a bound state and vice versa. The dose contribution from tritium bound to organic compounds is considered to account for 10% of the total dose when evaluating tritium exposures, as ICRP stated.

Few selected data set on urine tritium concentration history will be analysed using both ICRP model and other approaches. Uncertainty of dose assessment for the CANDU workers will be analyzed and improved analysis protocol for urine and blood will be proposed, including distinct measurement of OBT.

ICRP 1989 Age-dependent doses to members of the public from intake of radionuclides: part 1 ICRP Publication 56; Ann. ICRP 20 (2) (Oxford: Pergamon)