

**50 years Environmental Tritium transfer review
in the vicinity of a French Research centre**

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The objective of this document is to describe the behavior of tritium in the environment from the survey data of the site of a French research centre.

Since the late 60's, the nuclear site of Valduc, located 250 km South-East from Paris, has been discharging tritium gas and tritiated water to the atmosphere. The annual tritium release decreased from 100 g in 1974 to less than 1 g in 2009. Those discharges have led to a transfer to the nearby groundwater and rivers. A balance of the tritium migrating through the hydrogeological system is presented for the 1969-2009 period.

From the hydrogeological point of view, Valduc is located in the middle of a 40 km² watershed. It coincides with a hydrogeologically closed system which enables to estimate the annual incoming and outgoing tritium content.

The annual wet and dry deposition of tritium is estimated by measurements on site and atmospheric modeling. The outgoing is calculated at the outlet of the system from the measured tritium content and the river flow. It occurs that during the 1969-2009 period, 7.5 g of tritium infiltrated whereas 0.56g flowed out of the river. Due to radioactive decay only 1.4 g of tritium still remains in the hydrogeological system today.

Surface survey data bring also quite a lot of information about transfers by the air pathway. This concerns the different compartments: air, rain, soil, vegetable and animals. Ratios between the different compartment concentration show that air-leaves transfer is important, that rain and air deposition are of the same order of magnitude, and that a relatively good equilibrium exist between free and organic material water of the vegetable.

Some outdoor experiments confirm, in agreement with literature, the level of incorporation in organic materials.

Outside the centre, water always remained below the present WHO limit of quality for drinkable water, which is 104 Bq.L⁻¹. Radiological impact has been assessed and is presently less than 1μSv.y⁻¹ for individual of the nearby population.

Tritium appears to be a very good indicator of the site specific characteristics..