# Depth Profile of Tritium in Concrete around a Fusion Device

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There are two sources of indoor air tritium in a fusion facility, the one consists of some leakage from blanket or fuel system, and the other is produced by reactions between neutron and nuclei in concrete surrounded a fusion device. Some amount of tritium in concrete would be migrated to indoor air, and it should be taken into account with monitoring of exhaust air. Leaked tritium from blanket or fuel system would be deposited to the surface of concrete. On the other hand, tritium due to neutron has a profile with a maximum not on the surface but on a certain depth. The emanation from concrete will depend on a tritium profile in concrete. Therefore, it is important to know the profile of tritium in concrete so as to monitor and discuss the variation of indoor tritium concentration.

In this study, the depth profile of tritium in concrete near a fusion device has been calculated from an energy spectrum data of neutron which can be obtained by means of a radiation transport calculation code. A fusion device and surrounded biological shielding concrete were described on cylindrical coordinate system, and 175 energy groups of neutron on each mesh were obtained by DORT code which is a two dimensional radiation transport code. DT fusion reaction in a fusion device generates 14 MeV neutrons. The neutrons are moderated or absorbed by first wall, blanket, coil and cryostat. After that, neutrons come to concrete floor or wall. Thermal neutron is a main component for creation of tritium. The production of tritium increases gradually up to 10 cm depth in concrete, and the concentration at this depth is two times of that near the surface. After the maximum, the concentration decreases exponentially. On the assumption that all tritium is accumulated and remained the same position, the concentration will be 10 kBq/cc at the maximum point in concrete after 10 years operation at 3 GW fusion power. These profile data of tritium in concrete are useful for monitoring of indoor air and for decommissioning of a facility.