Tritium Safety Assessment for Fusion Reactor Based on Environmental Dispersion Modelling

The tritium environment assessment module of TAS has been developed to assess the HT/HTO concentration in air, soil, plants and animals as well as the dose to the workers and public under the routine condition and accident events. In the TAS model, the Gaussian puff model is introduced to calculate the HTO concentration in air for reemission under accident events. Some corrections are used in the Gaussian plume and puff model for emission and reemission. Besides, the integral average of the concentration of tritium in the atmosphere is introduced for accident emission. In dose model, the inhalation and absorption dose from the skin of HTO, drinking water of HTO and ingestion of HTO and OBT are considered. The recipes could vary from place to place.

To validate the module, the comparisons with UFOTRI code are carried out. The results of concentration in air show a good agreement with UFOTRI, and the total dose is also within the same order of magnitude. Besides, the calculations are also compared with the results of the Canadian HT release experiment on June 1987. The results show that the estimated dose of TAS model corresponds better to the experiment values than ACUTRI model. Considering the comparisons above, it is concluded that the TAS code could be used to the tritium environment assessment for fusion with sufficient accuracy.

In addition, more detailed issues will be completed in the future. Such as developing related experiment on tritium environment assessment to develop the new detail model, and will be used to improve and validate the model of TAS code.