

Tritium Activities in Romania, Potential Support for Development of ITER Project

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Abstract : In any fusion device, tritium plays a key role both as a fuel component and, due to its radioactivity and easy incorporation, as tritiated water (HTO). As for the ITER project, to reduce the constant potential of tritium emission, there will be implemented a Water Detritiation System (WDS) and an Isotopic Separation System (ISS). In the same time, during operation of fission CANDU reactors, the tritium content increases in the heavy water used as moderator and cooling agent (due to neutron activation) and it has to be reduced, too. In Romania, at the National Institute for Cryogenics and Isotopic Technologies (ICIT Rm-Valcea), there is an Experimental Pilot Plant for Tritium Removal (Exp. TRF), with the aim of providing technical data on the design and operation of an industrial plant for heavy water depreciation of CANDU reactors from Cernavoda NPP. The selected technology is based on the catalyzed isotopic exchange process between deuterium and liquid water (LPCE) combined with the cryogenic distillation process (CD). This paper presents an updated review of activities in the field carried out in Romania after the year 2000 and in particular those related to the development and operation of Tritium Removal Experimental Pilot Plant. It is also presented a comparison between the experimental pilot plant and industrial plant to be implemented at Cernavoda NPP. The similarities between the experimental pilot plant from ICIT Rm-Valcea and water depreciation and isotopic separation systems from ITER are also presented and discussed. Many aspects or 'opened issues' relating to WDS and ISS could be checked and clarified by a special research program, developed within ExpTRF. By these achievements and results, ICIT Rm - Valcea has proved its expertise and capability concerning tritium management therefore its competence may be used within ITER project.

Keywords : ITER project, heavy water detritiation, tritium removal, isotopic exchange

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