

Safety Approach to handle Tritium in ITER Fusion Installation

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Nuclear fusion of light nuclei (Deuterium-Tritium) is one of the very few options potentially acceptable from the environmental, safety and economic points of view, to provide energy over the long term for a growing world population. Advances in fusion science arising from a large set of fusion experiments worldwide, together with the development of key fusion technologies, have provided the international fusion programme with the necessary body of knowledge required to demonstrate the scientific and technological feasibility of fusion power for peaceful purposes. The International project ITER, under construction near Cadarache in the southeast part of France by China, Europe, India, Japan, Russia, South Korea and United States, is an experimental installation designed to provide the definitive demonstration that the dream may become reality.

ITER is a long pulse tokamak that in nominal operation produces a deuterium-tritium fusion power of 500 MW for a burn length of 400 s, with the injection of 50 MW of auxiliary power also called “additional heating”. ITER is the first fusion facility that is fully nuclear and takes advantage of the nuclear burn of tritium as fuel for the production of energy. It is therefore very important for this Project and for the future of fusion power plants, to demonstrate the attractive safety and environmental features of this new nuclear technology. As an example, to prevent any significant tritium releases, ITER will be the first tritium facility with full tritium recycling capabilities and atmospheric and water detritiation systems. Low gaseous and liquid releases are then expected in normal operation.

In this paper, a full description of the ITER facility will be presented with a particular emphasis on the safety principles and criteria used for minimizing the consequences to the public and the environment from ITER tritium operations.