Main Safety Issues at the Transition from ITER to Fusion Power Plants

W. Gulden, S. Ciattaglia, V. Massaut, P. Sardain
(werner.gulden@tech.efda.org)

EFDA CSU Garching, Boltzmannstr 2, D-85748 Garching, Germany

Abstract
In parallel to the ITER design process and in close cooperation with the designers a fusion specific safety approach was developed and implemented. Detailed safety assessments have been performed and documented in the ITER Generic Site Safety Report (GSSR). Following the decision on ITER construction in France, results from the GSSR and from ongoing safety related activities tailored to the Cadarache site and French licensing process are now being used to write the ITER Preliminary Safety Analysis Report (RPrS).

In the most recent European Fusion Power Plant Conceptual Study (PPCS) the inherent fusion favourable features have been exploited, by appropriate design and choice of materials, to provide major safety and environmental advantages. The study focussed on five power plant models, which are illustrative of a wider spectrum of possibilities. These span a range from relatively near-term concepts, based on limited technology and plasma physics extrapolations, to a more advanced conception. All five PPCS plant models differ substantially in their plasma physics, blanket and divertor technology, size, fusion power and materials compositions, and these differences lead to differences in economic performance and in the details of safety and environmental impacts.

The paper uses the quite detailed information available from ITER safety documents and highlights the differences between ITER and future fusion power plants. Main areas investigated are releases and doses during normal operation and under accidental conditions, occupational radiation exposure and optimisation, and waste management, including recycling and/or final disposal in repositories.