

Future US ITER Safety Studies

D. A. Petti, B. J. Merrill

*Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID,
pti@inel.gov*

The US Fusion Safety Program played a prominent role in the development of safety related data and documents during the Engineering Design Activity (EDA) phase of the International Thermonuclear Experimental Reactor (ITER) project. This role included defining possible accident scenarios for ITER based on existing failure rate data given the adopted radioactive confinement strategy for ITER, and the analysis of these accident scenarios using aerosol data, tritium permeation data, and safety related computer codes. The culmination of this safety activity was the publication of the ITER Non-Site Specific Safety Report (NSSR). ITER safety work has continued during the ITER-FEAT design activity, in the absence of US participation but with the use of US developed safety analysis tools, to produce the ITER-FEAT Generic Site Safety Report. Now that the US has reentered the ITER project, the US Safety Program has been tasked to address safety areas left unresolved by the absence of the US during the past five years. There are four general areas that will be addressed, which are:

- 1) validation of US safety analysis tools (calculations with quantified uncertainties with the level of detail to depend on regulatory requirements of the actual site) that underpin the ITER safety analysis,
- 2) validation of magnet safety codes against medium scale magnet and busbar arcing experiments to demonstrate that ITER can tolerate large internal and external arcs in the magnet systems without degrading the integrity of radioactive confinement barriers to the point where resulting radioactive releases produce site boundary doses that exceed allowable limits,
- 3) refinement of dust inventory estimates in ITER, development of dust mobilization data under off-normal conditions and development of a dust removal strategy that will demonstrate compliance with dust safety limits in ITER and not hamper operational flexibility of the machine, and
- 4) further refinement of tritium inventory estimates in ITER mixed material plasma facing components (PFCs) and demonstration that removal strategies are effective at the ITER scale to comply with safety limits.

In this paper we describe these task areas and the time frame for completing these tasks.