

Cleaning and decontamination methods in the ITER Hot Cell Facility

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During ITER Tokamak machine operations, in vessel components will become activated by neutron heating and/or will be contaminated with tritium or covered with activated dust. Components removed from the vacuum vessel will be heavily contaminated with tritium. They will be handled and stored in the Hot Cell Facility (HCF). Consequently, the maintenance of these components will have to be performed in an adequate and safe nuclear confinement.

The HCF is designed to support the Tokamak machine. Its mission is to meet the requirements of the maintenance and upgrade plan, and process the radwaste. Cleaning and decontamination of in vessel components and tools is therefore one of the main functions that has to be implemented in the HCF design. The aim of this cleaning and decontamination step is to ensure that radiation and tritium contamination levels are reduced to as low as reasonably practicable.

There has been a significant amount of work undertaken to investigate various cleaning and decontamination methods for equipment and materials used in fusion experiments. However, there has been no dedicated investigation in order to adapt the most promising methods to the specific nuclear environment in the HCF.

This paper will firstly review the different that have been successfully used in the nuclear fission and fusion fields. This review of decontamination and cleaning methods has identified several key technologies that could be deployed for tritium and activated dust removal in the HCF. These technologies were assessed for their efficiency, impact on sequence of operations, impact on the HCF design and its infrastructure The trade off analysis shows that a multi-disciplined approach for decontamination and cleaning of in vessel components and associated tools, based on vacuuming, gas abrasion such as CO₂ pellet blasting and laser ablation, would have the most chance of ensuring that radiation and contamination levels thresholds are likely to be met. Recommendations for radiation measurement and tritium monitoring methods in line with the proposed HCF decontamination and cleaning techniques will be also presented.

Finally, other specific recommendations will be given concerning the cleaning and decontamination methods in the HCF.

Topic 2. Decontamination and waste management

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