

原型炉のホットセルにおける廃棄物管理シナリオの検討 Waste management scenario in Hot cell for DEMO

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Previously, waste management of strategy of fusion reactors has been considered for the time after of decommissioning. However, radioactive waste is also generated in the periodic replacement of in-vessel component such as blanket modules and divertor, and over every a few years during the operation. Rather, the management strategy of radioactive waste generated in the periodic replacement may be much more important in the point of view of fusion reactor design, because it has a large impact on the design of the hot cell and waste storage.

A waste management scenario for a fusion DEMO reactor is shown in Fig. 1. In the replacement period of a fusion power reactor, blanket and divertor modules should be removed from the reactor as an assembly for plant availability. It is assumed that the sector assembly is changed over at every two years during the operation. In the hot cell, the modules will be removed from the back plate of the assembly. Since the back plate made of F82H can be reused, the decay heat must be removed using active cooling to

keep the temperature below 550 °C for structural strength of F82H. At the same time, the active cooling must not cause a contamination of the hot cell environment due to dispersion of tritium and tungsten dust. The cooling scenario is one of key points in the waste management. The other point is recycling scenario for rare or useful metal like beryllium and enriched lithium-6 used as multipliers and breeder in the blanket. After the decontamination of the blanket modules has been completed, Li_2TiO_3 and Be_{12}Ti pebbles need to be collected for recycling after a certain period of cooling of radioactivity. Since the structural material as F82H of the blanket and divertor is not reused nor recycled because of high contact dose rate, the F82H should be kept in the interim storage until the time of disposal. The problem is the space for storage. Breaking up the F82H into small pieces reduces the volume of the waste, contributing to a reduction of the storage space.

In this poster, the basic idea of the waste management scenario and the conceptual design in the hot cell for DEMO are proposed.

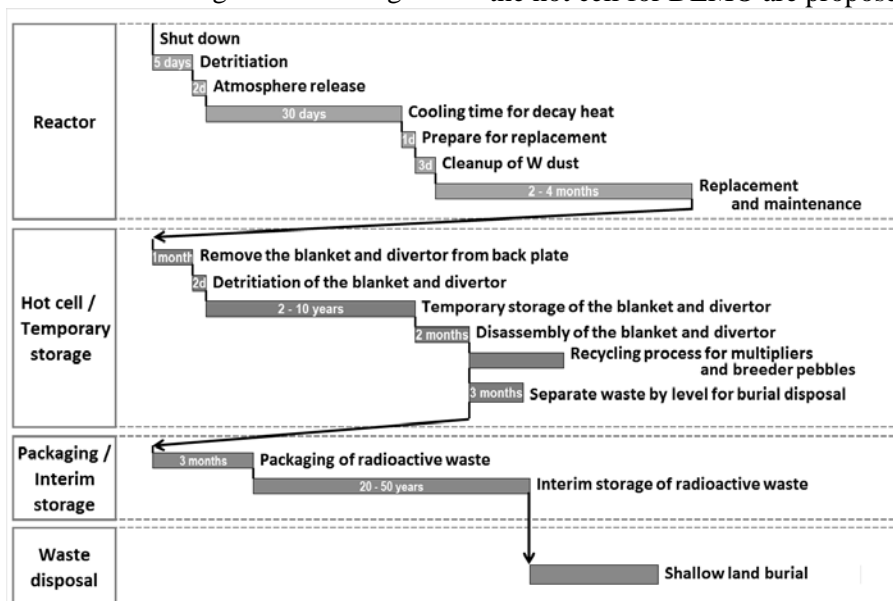


Fig. 1. Waste management scenario for fusion DEMO reactor