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## P3.216 Commissioning of The Materials Detritiation Facility at Culham Science Centre

*Wednesday, 19 September 2018 11:00 (2 hours)*

The Materials Detritiation Facility (MDF) has been designed to thermally treat solid non-combustible radioactive waste produced during operations of the Joint European Torus (JET) that is classified as Intermediate Level Waste (ILW) in the UK due to its tritium inventory ( $>12\text{kBq/g}$ ). The wastes primarily comprise Inconel, steels, aluminium alloys, copper and carbon-based composites. These materials will be thermally treated in a retort furnace at temperatures up to  $1000^\circ\text{C}$  under a flowing air atmosphere to reduce their tritium inventory sufficiently to allow disposal at a lower waste category. The tritiated exhaust gases from the furnace will be processed through a bubbler system, where released tritium will be trapped in water.

Commissioning of the facility has been divided into two constituent parts: inactive and active. The inactive commissioning is to verify that all components and safety systems of the facility are installed, functioning and operating within their design limits. Several inactive trials of the thermal treatment process will be performed on each material type.

During the active commissioning, small amounts of tritium-contaminated material will be introduced into the process and used for limited active trials. The tritium inventory in this material has been selected to be As Low As Reasonably Practicable (ALARP), ensuring that activity levels are sufficient to fully test the process design and control instrumentation but pose minimal risk to operators. The active trials will include four thermal heating cycles on carbon-based and Inconel materials incorporating increasing levels of tritium (ca.  $1\text{MBq}$ ,  $3\text{GBq}$ ,  $20\text{GBq}$  and  $26\text{GBq}$  respectively). Materials used in the active trials will be sampled and analysed before and after thermal treatment to verify the performance of the process and confirm that the bulk of the tritium has been removed from the solid matrix by the heating process and has been recovered into the water within the bubbler system.

**Presenter:** KRESINA, Michal (DSN CEA)

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