

## Packaging of WEP wastes derived from 5% LEU fuel

### Summary of Assessment Report

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#### ***Background***

The Sellafield Wastes Encapsulation Plant (WEP) packages ILW streams arising from the Thermal Oxide Reprocessing Plant (THORP). WEP has been operational since 1993, following issue of a Final Letter of Compliance (fLoC) covering four waste streams. In order to confirm ongoing compliance with disposal requirements, the fLoC covering WEP waste packaging was subject to Periodic Review by Radioactive Waste Management Directorate (RWMD) during 2007. At this time Sellafield Limited (SL) declared their intention to reprocess fuel from the Trino reactor. This was excluded from the revised fLoC issued for WEP wastes, and Action Points were raised to define the information requirements to support endorsement of such a proposal.

Sellafield Limited (SL) has now sought to extend the final stage endorsement of THORP wastes to cover proposals for the packaging of Trino fuel waste streams at the WEP. The Trino fuel is based on 5wt% U235 Low Enriched Uranium (LEU), with some fuel elements containing Sb/Be neutron sources.

This Assessment Report provides the basis and findings of an assessment by NDA Radioactive Waste Management Directorate (hereafter RWMD) for 500 litre drum waste packages containing 5wt % U235 LEU fuel wastes, with elevated Be levels, arising from the THORP. Understanding the criticality compliance requirements for LEU waste packages containing Trino fuel wastes was identified as a key piece of work necessary to facilitate any endorsement.

The assessment has been carried out through the Disposability Assessment process, whereby RWMD examines the disposability of proposed waste packages by assessment against the Generic Waste Packaging Specifications (GWPS) for ILW, and the standards and specifications of the Geological Disposal Facility (GDF) concept.

#### ***Waste Packaging Proposal and Outcome of Assessment***

A new criticality safety assessment was produced for Trino fuel waste packages supported by updated Criticality Compliance Assurance Documentation (CCAD) and Waste Product Specifications (WPrS) for specific THORP waste streams.

RWMD has reviewed the SL submission with consideration of the Action Point raised in the Periodic Review for Trino wastes. Other outstanding WEP Action Points relevant to the WEP fLoCs being extended to cover the packaging of 5wt % U235 LEU / Trino fuel waste streams have also been reviewed.

The RWMD assessment has identified a package Safe Fissile Mass (SFM) of 300g U235 equivalent with up to 1000g of Be present. The case presented in the CCAD shows that this can be adequately controlled, as the probability of exceeding the SFM due to a WEP Hulls Metering System over batching fault is so small it can be ignored.

## ***Conclusions***

RWMD has reviewed the submitted WEP WPrS and CCAD documents, with consideration of the outstanding Action Points relevant to the WEP fLoCs being extended to cover the packaging of waste streams arising from the reprocessing of Trino fuel. A total of 8 Action Points have been closed out. One new Action Point has been raised to identify specific work required to progress fLoC endorsement of the proposed WEP waste packaging processes for 5wt% U235 LEU / Trino fuel wastes.