

Alternative ILW Management Approach for Magnox Swarf Storage Silos at Sellafield

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The Magnox Swarf Storage Silos (MSSS) has been used to hold intermediate level waste primarily from Magnox fuel decanning, for decades. The aging facility poses an intolerable environmental hazard and the waste within needs to be retrieved to allow decommissioning of the facility. The previous strategic approach led to complex engineering solutions and a perception of potentially significant consequences from hydrogen or ignition events from the presence of reactive materials within the waste.

The main issues affecting retrieval of the waste are centred on limited understanding of both the current composition of the waste and the behaviours likely to be exhibited during retrievals and processing. The two main risks considered within the reactive materials work were:

- Generation and evolution of hydrogen gas
- Presence of self-igniting (pyrophoric) materials leading to waste fire

A combination of broad research and empirical experiments has led to improved understanding of the corrosion processes in MSSS. A more accurate picture of the waste inventory at retrieval has been developed, as well as a more realistic basis for waste behaviour during retrieval and downstream processing.

The research and development focused initially on the corrosion mechanisms of uranium and magnesium; this was used to model the waste tipping, storage and planned retrievals. The predicted waste container payloads are now expected to present a significantly lower hydrogen and pyrophoric challenge than the previously assumed basis. Investigations into the reactivity of the more hazardous components, such as uranium hydride, which might cause problems for safety and engineering followed. Technical specialists carried out assessments on the formation, survival and reactivity of these reactive materials in order to evaluate the pessimisms constraining the design process, and to identify opportunities to reduce these restrictions.

The results were so favourable that not only was the objective of underpinning the assumed design basis achieved, many additional opportunities were identified. An early opportunity realised was a change from a sealed inerted flask into a passively vented flask. However, the most fundamental opportunity is for accelerated MSSS risk and hazard reduction to include the storage of waste in an interim store.

The strategic review identified a much simpler approach to retrieval and processing of the MSSS waste involving interim storage of the waste in its raw form in a double-skinned steel box with an intermediate grout bund, which would then be placed in one of the Sellafield site product stores until an appropriate final conditioning plant is ready, prior to ultimate disposal in Geological Disposal Facility.

Country or International Organization

UK, Sellafield Ltd

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