

Science Project: Feasibility and Implications of Reworking of Intermediate Level Radioactive Waste Packages

There are no disposal routes currently available for intermediate level radioactive waste (ILW) within the UK. In the meantime, ILW is being stored. The purpose of this research is to help us understand the risks involved from storage of ILW by looking at the different reworking methodologies, and developing suitable protocols for applying this knowledge in the future. ILW is currently conditioned in accordance with the Nirex LoC process. Typically, this conditioning involves the use of cement-containing materials; the resulting wasteform being packaged in stainless steel containers. The waste packages so produced are currently held in interim storage facilities. The principal reason for early conditioning of ILW is to reduce the possibility of contaminants leaking into the environment, so protecting both workers and the public from the risk of exposure to intermediate level radioactivity.

The UK strategy for managing radioactive waste is currently under review by the Committee on Radioactive Waste Management (CoRWM). At the time of writing this document, CoRWM is completing the second stage of public consultation on the subject. The four short-listed options for the future management of radioactive waste will all involve significant periods of interim storage.

During storage, waste packages might require reworking. The feasibility and implications from reworking ILW packages have yet to be fully evaluated but in any case, will depend, to a large extent, on the eventual government policy for long-term waste management. We therefore need to understand the environmental risks associated with any future requirement for reworking.

The work described in this report was undertaken in support of the Environment Agency's Nuclear Waste Assessment Team (NWAT). The objectives of the study were:

- to assess the reasons why reworking of ILW packages might be required;

- to identify different reworking methods and their feasibility;
- to assess the potential strategies for reworking and their implications, including environmental impacts.

The main reasons for reworking were identified as damage to, or deterioration of an ILW package; and the package becoming out-of-specification due to external factors, such as changes in Government policy. A wide range of reworking methods is available, but there is little experience of using them. There are four generic types of reworking:

- repair of the waste container;
- use of an overpack (e.g. for cases where only the waste container has deteriorated);
- stabilisation of the wasteform (e.g. pressure injection of a stabilising material);
- retrieval and reconstitution of the wasteform.

A literature survey established the level of existing experience in respect of ILW package reworking across the world. The case studies identified indicated that for loose, drummed waste etc, the waste is generally unpacked, treated and repacked or repacked and then compacted. For conditioned waste the favoured method was over-packing plus a non-intrusive remediation of the package if necessary. Under the national regulatory frameworks and legislative constraints applicable to each scenario it is evident that most waste-management organisations would prefer to avoid breaking up conditioned wasteforms if at all possible.

We organised a workshop for regulators, operators and other experts to support the main objectives of this study. Although participants at the workshop identified specific reasons for reworking, and strategies to facilitate it, they did not express a common viewpoint on what constituted examples of good practice for determining appropriate reworking strategies. This was due to specific issues associated with each of the different product types. However, as a result of the workshop, the participants suggested that a stepwise process could be applied to any waste package and wasteform, enabling proper consideration of the effects of no or low intervention. Thus, a qualitative assessment of the impact of different reworking strategies was possible, and it was concluded that the most invasive seem to have the highest environmental, safety and cost impacts.

Further work is increasing our understanding of the likely conditions requiring ILW waste packages to be reworked during (prolonged) storage. In addition, it might be necessary to test the reworking stepwise process mentioned above (for specific ILW package types and for any hypothetical events where reworking techniques might need to be implemented); and to maintain a watching brief on international developments in this area.

This Summary relates to information from Science Project SC040067 reported in detail in the following output(s).

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