

Packaging of Trawsfynydd Desiccant Waste (Conceptual stage)

Summary of Assessment Report

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Background

British Nuclear Group Project Services acting on behalf of Magnox North has sought Conceptual stage endorsement for the production of disposable waste packages containing activated alumina and molecular sieve materials. The waste is classified as Intermediate Level Waste and currently held in temporary storage in the Active Waste Vaults at Trawsfynydd Decommissioning Site.

This document summarises the results of the assessment carried out by NDA Radioactive Waste Management Directorate in response to the submitted proposals. The assessment has been carried-out as part of the Letter of Compliance process, whereby NDA examines the disposability of the proposed waste packages by assessment against ILW packaging standards and specifications and the Phased Geological Repository Concept (PGRC). Further information on the Letter of Compliance process is available elsewhere¹.

Scope of the Proposals

Activated alumina and molecular sieve materials were used during operation of the twin Magnox reactors at Trawsfynydd Power Station. A drier system was employed to remove excess water moisture from the carbon dioxide reactor coolant gas, to reduce the corrosion rates of metal and graphite components in the reactor primary gas circuit.

Following conditioning and packaging the desiccant waste is expected to produce approximately 10 waste packages. The waste corresponds to waste stream 9G14 in the 2004 National Radioactive Waste Inventory. The radionuclide inventory is very low and will be towards the bottom of that expected in intermediate level waste. In addition the activity content is expected to be dominated by tritium, which has a relatively short half-life of approximately 12 years. Therefore the waste packages may well decay to levels that are compatible with low level waste at a future date, beyond 2060.

Packaging proposals

The immobilisation process can be considered in two stages:

- the initial identification and packing of the desiccant into purpose-designed closed containers (drums of 200 litre capacity manufactured in mild steel);
- prompt grout encapsulation of eight 200 litre containers within a 3m³ Box, to produce a passive safe and disposable package.

The desiccant drums would be loaded into the 3m³ Box and encapsulated using a cement grout based on 3:1 mixture of pulverised fuel ash and ordinary Portland cement (PFA/OPC), in a two pour basis. After setting of the initial pour, the drummed waste would be fully encapsulated by a second grout pour before the package is lidded. The 3m³ Box would be

¹ Guide to the Letter of Compliance Process, Nirex Document WPS/650, June 2006.

manufactured from stainless steel and would be compliant with NDA waste packaging standards.

Completed packages would be transferred into a concrete overpack for continued storage in the new ILW store to await transport to a final disposal facility.

Assessment of Disposability

The acceptability of the proposed packages has been assessed against criteria established within the PGRC and associated Generic Waste Package Specification (GWPS).

The Assessment of Disposability is based upon the radionuclide inventory data supplied by Project Services for the Trawsfynydd desiccant. It has been noted that the definition of a fully accurate radionuclide inventory is not possible until characterisation of the desiccant has been completed and all data collected.

The proposed waste packages examined herein are consistent with the requirements of intermediate level waste packaging standards for the packaging of solid wastes. Analogues of the proposed wasteform are available and the assessment undertaken by NDA Radioactive Waste Management Directorate provides confidence that an adequate waste package performance could be produced by cement encapsulation of the packed Trawsfynydd desiccant.

The assessments of transport safety show that it should be possible for 3m³ Boxes containing Trawsfynydd desiccant to comply with all relevant transport safety criteria if transported in a Type B transport container with 70mm thick walls, such as the Standard Waste Transport Container (the SWTC-70).

Similarly, the assessments of operational safety show that it should be possible for 3m³ Boxes containing Trawsfynydd desiccant to be handled and stored safely within the repository. The assessed doses for worst-case accidents are insignificant fractions of the limits applied by NDA, even with several conservatisms that have been used in the assessment. Furthermore, expected revisions to methods and parameters would be expected to reduce the assessed doses considerably. It is concluded that this provides robustness against any future changes to risk or dose targets.

The post-closure safety assessment revealed no significant areas of concern that should prejudice disposal of packages containing Trawsfynydd desiccant. This is due to the number of packages and the very low radionuclide inventory associated with them.

In summary, the Assessment of Disposability has concluded that a Disposability Safety Case ultimately could be made for packages containing Trawsfynydd desiccant, and that the proposals for the packaging of these wastes can be endorsed at the Conceptual stage. During the course of the assessment, areas requiring additional work to progress the proposals beyond the Conceptual stage were identified, and these are summarised below.

The proposal has been judged against the categorisation scheme proposed in the regulatory guidance² and determined from our perspective to be 'category Y' given that the physical nature, chemical and radionuclide content fall well within previous experience and the packaging process uses known technology in a standard manner.

² *The Management of Radioactive waste on Nuclear Licensed Sites*, Guidance from HSE, EA and SEPA to Nuclear Licensees, Part 1 – The Regulatory Process, version issued for consultation and trial use, February 2007.

Requirements for further development work

The assessment by NDA Radioactive Waste Management Directorate has been based upon the development work performed by Project Services and Magnox North. At the future Interim stage, it is required that the detailed radionuclide inventory data, final design specifications and results of underpinning research and development should be agreed and demonstrated through the following:

- confirmatory characterisation of the desiccant waste;
- finalisation of waste container design, including 200 litre container;
- provision of proposals for producing waste package records;
- proposals for the storage and monitoring of completed waste packages;
- continuing provision of evidence that activities such as waste characterisation will be performed under a suitable Quality Management System.

Conclusions

The assessment of the proposals has concluded that Trawsfynydd desiccant may decay to low level waste levels at some time beyond 2060. Notwithstanding this the proposed waste packages have been considered against deep disposal criteria and found to be potentially consistent with disposal under the PGRC and can be endorsed at the Conceptual stage. The consistency of the proposed waste packages with the PGRC has been demonstrated through the provision of an Assessment of Disposability.