Nuclear Decommissioning Authority

Radioactive Waste Management Directorate

Solid ILW at Hunterston Decommissioning Site (Interim stage)

Summary of Assessment Report

Issue date of Assessment Report: 9 July 2010

Introduction

Magnox North has provided Interim stage proposals for the packaging and conditioning of solid Intermediate Level Waste retrieved from the Bunkers of the Solid Active Waste Building at Hunterston Decommissioning Site, in a form that will allow for their acceptance at a future disposal facility.

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 using 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 Geological Disposal Concept. Further information on the Letter of Compliance process is available elsewhere[1]. The Regulator's view is that packages conditioned in anticipation of geological disposal, and assessed under the Letter of Compliance process, will also be suitable for long-term storage in accordance with Government policy in Scotland.

This report is a re-issue of a report that was first issued in November 2008, and presents an updated position based on additional information supplied.

Scope of the Proposals

Solid intermediate level waste has been produced during operation of the twin Magnox reactors at Hunterston A Power Station. The waste corresponds to 22 solid ILW waste streams in the 2007 National Radioactive Waste Inventory.

At Hunterston A, solid intermediate level waste (ILW) was generated from the treatment of spent Magnox reactor fuel prior to transport to Sellafield for reprocessing. The Hunterston solid ILW comprises Fuel Element Debris including Magnox items known as splitter blades and braces (splitters) and Graphite sleeves that were removed from the outside of fuel elements to assist with the packing and transport of fuel for reprocessing. The resulting waste is predominantly composed of Graphite, with some Magnox metal (a magnesium-based alloy that corrodes relatively easily) and steel items including fuel support members.

1 *Guide to the NDA Radioactive Waste Management Directorate Letter of Compliance Process*, NDA Document WPS/650, March 2008.

The total packaged volume of these wastes is expected to be approximately 3,650m^3. These wastes therefore constitute approximately <2% of the total volume expected to form the waste inventory in the 'unshielded ILW' category being considered by NDA Radioactive Waste Management Directorate. The activity of these wastes are low in comparison to the average inventory of ILW.

It is suggested that the proposals be considered as MEDIUM priority under the current regulatory prioritisation scheme. The principal reasons for this judgement are the significance of the waste volume, comprising more than 1% of the capacity of the anticipated repository for ILW.

Packaging Proposals

The strategy for Hunterston solid ILW involves early retrieval and packaging to NDA standards and specifications through a process of mechanical retrieval from storage bunkers, sorting to quantify any pieces of nuclear fuel and remove mobile particulate material, placement in stainless steel standard 3m^3 Boxes and immobilisation using a cement grout. The mobile particulate material would be transferred into 3m^3 Drums and immobilised through in-drum mixing with cement grout. The waste packages would then be transferred to a purpose-built, shielded ILW store on the Hunterston site.

Magnox North has previously submitted proposals for the management of solid intermediate level waste based on retrieval, sorting, segregation and solid waste packaged into 3m^3 Box and Drum waste containers, which are manufactured from stainless steel and would be compliant with NDA waste packaging standards. These proposals were endorsed at Conceptual stage.

The waste would be fully encapsulated using a cement grout based on a mixture of blast furnace slag and ordinary Portland cement for solid waste and immobilisation of particulate using in-drum mixing of waste with pulverised fuel ash ordinary Portland cement. After setting of the cement grout a final capping grout based on a blend of pulverised fuel ash and ordinary Portland cement (PFA/OPC) would be added before the package is lidded.

Completed packages would be transferred using a shielded cross-site transporter for continued storage in the new ILW store.

Assessment of Disposability

The assessment has highlighted the importance of positively identifying the components of the waste requiring further treatment or characterisation, during retrieval and/or packing operations. This will be necessary to ensure that any limits on specific components of the waste or the mixing of wastes, are adhered to and to ensure that objective evidence of such adherence is recorded and retained. The successful diversion of such waste items and the treatment undertaken will need to be verified and recorded. Furthermore it has been recommended that additional work is undertaken to ensure that systems are developed to facilitate this requirement given that some of the relatively old stored wastes may not be readily identifiable on retrieval.

Magnox North has recognised the importance of controlling the storage environment to maintain humidity and chloride levels within appropriate bounds and will apply controls defined within NDA guidance and the Magnox Electric Ltd code of practice for care of intermediate level waste packages. These should be applied throughout the period of storage to give confidence that package containment and integrity is maintained and that they are fit for onward stages of management.

The proposed $3m^3$ Box and Drum waste packages examined herein are, at this Interim stage, judged to be consistent with NDA standards and specifications for waste packages. It is noted that further work has been undertaken to finalise the development of the detailed container designs to be compatible with the proposed packaging route. Wasteform development undertaken and reported, provides confidence that an adequate wasteform could be produced for the Hunterston solid ILW, including the effective immobilisation of particulate associated with the solid waste.

The assessments of transport safety show that it should be possible for the $3m^3$ Box and Drum packages containing Hunterston solid waste to comply with all relevant transport safety criteria when transported using the Standard Waste Transport Container (SWTC). It is noted that the on-site conditioned waste storage facility should be designed to provide access and compatibility for the interfaces of the SWTC, to enable transfer of the waste packages to any future disposal facility.

Similarly, the assessments of operational safety also show that it should be possible for $3m^3$ Box and Drum packages containing Hunterston solid waste to be handled and stored safely within the Geological Disposal Facility.

The post-closure safety assessment revealed no significant areas of concern that could prejudice disposal of packages containing Hunterston solid waste. This is due to the relatively low and short-lived radionuclide inventory associated with them relatively and distributed nature of toxic materials.

The waste stream is expected to contain some fuel and fuel related materials. A simple Criticality Compliance Assurance Document has been developed for the proposed packages, which can be developed to demonstrate control of fissile material in the waste packages, so that they would not present a criticality hazard.

In summary, the Assessment of these proposals for Hunterston solid ILW has concluded that the process should lead to the production of compliant waste packages, noting that adequate provision is provided for particulate segregation and identification and diversion of wastes that require additional treatment, that are suitable for long-term management and consistent with geological disposal. RWMD has concluded that the proposed waste packages can be endorsed by the issue of an Interim stage Letter of Compliance.

Requirements for Final stage

The assessment by NDA Radioactive Waste Management Directorate has been based upon completion of development work reported at this Interim stage. At a future final stage, it is required that details of the packaging proposals are finalised and substantiated through the provision of evidence in the following general areas:

- Finalisation of the three Draft WPrS that have been developed;
- Confirmation of plant design and operational procedures for the key parameters identified in each of the WPrS;
- Finalisation of detailed proposals for provision of package records for both package types;
- Provision of evidence that plant operations and controls will be performed under a suitable Quality Management System;
- Finalisation of Draft Criticality Compliance Assurance Document.

Conclusions

The Interim stage proposals from Magnox North for the retrieval, segregation, characterisation and packaging of solid ILW at Hunterston have been assessed.

The assessment of the proposals has concluded that packages containing conditioned solid ILW retrieved from the Bunkers at Hunterston Decommissioning Site are expected to be consistent with requirements for passive safety and geological disposal.

The consistency of the proposed waste packages with geological disposal has been demonstrated through the provision of an Assessment of Disposability (at this stage to be regarded as a draft of an eventual Disposability Safety Case).

A number of Action Points raised during previous Conceptual stage proposals for the packaging of solid ILW have been closed out and a small number of additional Action Points have been generated, for completion at Final stage, as part of this assessment of the Interim stage proposals. Close-out of four Action points has been undertaken to enable issue of an Interim stage Letter of Compliance for the proposed waste packages.