Secondary Containment Vessel for 3m³ waste packages at Hunterston Decommissioning Site (Pre-Conceptual stage)

Summary of Assessment Report
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Background
Magnox North has sought advice and guidance on the proposal to use a Secondary Containment Vessel to overpack non-compliant waste packages from Hunterston Decommissioning Site such as to facilitate acceptance at a future disposal facility. At Hunterston plans are being developed for the retrieval and packaging of wastes; the mobile and particulate wastes are to be packaged into 3m³ drums and solid wastes are to be packaged into 3m³ boxes. The advice provided by this Assessment Report has been requested for the final stages of the design phase for the Secondary Containment Vessel, ahead of structural testing. Formal endorsement of the Secondary Containment Vessel is not being sought at this stage.

This document summarises the results of the assessment carried out by NDA Radioactive Waste Management Directorate (RWMD) 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 intermediate level waste (ILW) packaging standards and specifications. Further information on the Letter of Compliance process is available elsewhere

The RWMD Letter of Compliance assessment process provides advice on the suitability of proposals for conditioning higher-activity waste in anticipation of geological disposal. The assessment is based on standards derived from the RWMD geological disposal concept, but is also compatible with a range of other possible long-term management options. The regulators’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.

Scope of the Proposals
Hunterston are developing a Secondary Containment Vessel (SCV) to accommodate non-compliant 3m³ box or 3m³ drum waste packages that may be produced from the packaging of Intermediate Level Waste (ILW). The solid and mobile Intermediate Level wastes are to be retrieved from their existing storage facilities and processed in packaging plants to produce conditioned waste packages suitable for long term management. The mobile and particulate wastes are to be packaged into 3m³ drums and solid wastes are to be packaged into 3m³ boxes.

Hunterston Decommissioning Site recognises that retrieval and packaging operations may lead to the generation of some ‘non-compliant’ waste packages. The site strategy is that waste packages with minor faults will be remediated to bring them back into compliance with all relevant requirements of the NDA RWMD waste package specifications. Where the package faults are serious enough to prevent remediation, Hunterston propose to use the SCV as an overpack, resulting in a larger overall package. At this stage such a package would not be considered part of the suite of standard waste packages.

The SCV will also be used as a temporary containment vessel to allow the safe transport of non-compliant waste packages to an on site package remediation facility.

The use of an overpack for non-compliant ILW waste packages is a new development and Hunterston Decommissioning Site is seeking guidance and advice from RWMD so that the development of the SCV can be undertaken in collaboration with RWMD the objective being to confirm that the new overpacked waste package will be transportable and disposable when judged against RWMD plans and concepts for geological disposal.

It should be noted that a new container design cannot be endorsed through the issue of a Letter of Compliance without a change in the GDF concept, although the Assessment Report will assess the key features of the SCV and consider the implications and requirement for a package of this nature.

The use of the SCV on Hunterston site is expected to give rise to no more than five waste packages which represent an insignificant fraction of the total volume of waste being considered in the reference case for geological disposal. It is suggested that the proposals be considered as LOW priority under the current regulatory prioritisation scheme. The principal reasons for this judgement are the low significance of the inventory and relatively small volume.

**Assessment of Disposability**

The acceptability of the proposed packages has been assessed against criteria established from the geological disposal concept and identified in the associated Generic Waste Package Specification (GWPS).

The Assessment of Disposability is based upon a set of radionuclide inventories derived by RWMD using a series of assumptions about waste composition and treatment. Magnox North will be required to confirm that the range of waste package inventories and potential faults for remediation are appropriate.

In order to satisfy the various requirements of the GWPS, solid and mobile wastes are to be packaged in stainless steel containers using a process that involves intimate mixing of the waste with an encapsulating material. The resulting waste package thus forms one of the engineered barriers that provides passive safety and prevents the return of radioactivity to the environment. Such an approach to packaging will, in most cases, result in waste packages which are compatible with the requirements of the GWPS and which will be suitable for storage and subsequent transport to and disposal in a geological repository.
It has been assumed that a non-compliant 3m³ waste package could be placed in the SCV at the time of manufacture and remains within it during interim storage, transport to, and following emplacement in the GDF.

The assessments of Transport show that it would be possible for a waste package from Hunterston packaged in the SCV to comply with all relevant criteria if transported in 150 mm thick walled Type B transport container such as the postulated Standard Waste Transport Container (SWTC-150).

The assessments of operational safety show that, as far as can be assessed at this stage, it would be possible for 3m³ waste packages from Hunterston packaged in the SCV to be handled and stored safely within a geological disposal facility.

The post-closure safety assessment has revealed no areas of concern that should prejudice disposal of wastes packaged from Hunterston in the SCV.

In summary, the Assessment of Disposability has concluded that a Disposability Safety Case could ultimately be made for a 3m³ waste package, subject to full definition of the non-compliant waste package from Hunterston overpacked in the SCV.

Requirements for further development work

The following will need to be provided as part of any Final stage packaging proposals for the endorsement of a waste package from Hunterston packaged in the SCV:

- definition of waste packaging faults that have resulted in the need for use of SCV
- specification of an appropriate formulation of cementitious grout for infill grouting, where required, for use of the SCV
- confirmation of final design detail of the SCV and manufacturing specification
- development of the draft Waste Product Specification
- development of the SWTC-150 beyond its present concept design stage

These recommendations and issues for consideration have been defined within the Assessment Report.

Conclusions

The proposals from Magnox North to develop a Secondary Containment Vessel to be used as an overpack as part of the strategy to manage non-compliant waste packages in the event that these arise at Hunterston Decommissioning Site have been assessed.

The strategy is that waste packages with minor faults will be remediated by standard plant recovery procedures to bring the package back into compliance with all relevant criteria of the NDA RWMD waste package specifications. Where the package faults are serious enough to prevent remediation, Hunterston propose to use the SCV as an overpack, resulting in a larger package which is not considered part of the suite of RWMD standard waste packages at this stage.
It should be noted that a new container design cannot be endorsed through the issue of a Letter of Compliance without a change in the geological disposal concept. The assessment has considered the key features of the SCV and concluded that the concept as described could potentially be compatible with RWMD plans and concepts for transport and geological disposal. Following completion of this assessment RWMD will work with Hunterston Decommissioning Site to determine the changes to the geological disposal concept necessary to accommodate the SCV concept.

It is proposed that the SCV be developed in a staged manner with the next stage following successful completion of GDF change control being RWMD endorsement at the Conceptual stage. Final stage endorsement of an SCV for use as an overpack for a non-compliant package could only follow when the scope of the non-compliance is defined and its impact on package performance fully understood. This is likely to require case-by-case consideration. Magnox North may wish to consider whether there would be benefit in Interim stage engagement with consideration being given to various potential non-compliance scenarios in which the SCV could be adopted.