

## Packaging of Winfrith SGHWR Sludge

### Summary of Assessment Report

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#### **Background**

The packaging of the stored sludge that arose during the operation of the Steam Generating Heavy Water Reactor (SGHWR) previously has been assessed and endorsed through the issue of several Final stage Letters of Compliance. Since this endorsement was issued, it has become established that endorsement at the Final Stage should be accompanied by a demonstration that the resulting packages would be suitable for disposal (the Assessment of Disposability).

This document summarises the results of the assessment carried out by NDA Radioactive Waste Management Directorate to place on record an Assessment of Disposability for SGHWR sludge. 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 intermediate level waste (ILW) packaging standards and specifications and the Phased Geological Repository Concept (PGRC). Further information on the Letter of Compliance process is available elsewhere<sup>1</sup>.

#### **Scope of the Proposals**

The waste for disposal has resulted from the treatment of radioactive effluent arising from operation of SGHWR. Solids contained in the effluents were allowed to settle out in storage tanks and much of the supernate liquors ultimately were discharged to sea. The remaining solids are dominated by spent Powdex ion exchange resin, filter pre-coat material (Solkaflow BW40 and Metasil A) and effluents arising from the decontamination of the reactor primary circuit using Turco or Low Oxidation State Metal Ion (LOMI) reagents. In addition, lime was added to the tanks, after the addition of decontamination effluents. The total volume of waste, distributed across four tanks, is approximately 350 m<sup>3</sup>.

#### **Packaging Proposals**

Prior to retrieval, the contents of each of the tanks are homogenised by the use of submersible mixers, and batches of sludge are then retrieved and transferred to the encapsulation plant. It was originally proposed that the sludge would then be dewatered to a specified solids content by cross-flow filtration in the encapsulation plant. Problems during the commissioning of this plant necessitated modification of the process. The adjustment of the solids content of the sludge is now achieved by control of the supernatant level within the original storage tanks, prior to homogenisation and transfer to the encapsulation plant.

Substantial heels will remain after the retrieval and packaging of the bulk of the sludge. The proposed management of these remaining heels is based on re-suspension using additional water, followed by the transfer of all diluted heels into a single tank to be combined, settled and retrieved as above.

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

The encapsulation process is based on immobilisation in 500 litre stainless steel drums by the addition of cement powder, in this case a 9:1 mixture of blast furnace slag (BFS) and ordinary Portland cement (OPC), and in-drum mixing with a lost paddle. After a period of curing, a capping grout (3:1 mixture of pulverised fuel ash and OPC) is added and the drum lidded.

### ***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 inventory data generated by the UKAEA sludge sampling programme.

The proposed package is compliant with the requirements of the GWPS and has been judged to follow established good practice. Numerous analogues of the proposed wasteform are available and the associated development work provides confidence that an adequate wasteform can be produced for the SGHWR sludge.

The assessment of Transport safety shows that it would be possible for packages containing SGHWR sludge to comply with all relevant transport safety criteria. This assumes that the packages would be transported in a Type B transport container (as defined by IAEA Transport Regulations) with at least 70mm thick walls, for example the NDA Standard Waste Transport Container (SWTC).

Similarly, the assessment of Operational safety shows that it should be possible for the packages to be handled and stored safely within a repository based on the PGRC.

The post-closure assessment has revealed no significant areas of concern that should prejudice disposal of packages containing SGHWR sludge.

### ***Conclusions***

On the basis of the submitted information, the assessment of the proposal has concluded that the proposed packages are compliant with the requirements of the Phased Geological Repository Concept (PGRC) and can be endorsed as disposable via the Final stage Letter of Compliance.