

Croft 3m³ Safstores[®] for the packaging of ILW (Conceptual stage)

Summary of Assessment Report

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Introduction

Croft Associates Ltd (Croft) has sought advice on potential disposability issues that could arise from the use of their '3m³ Safstore' waste containers for the packaging of intermediate level waste (ILW), and has requested Conceptual stage endorsement of the container designs.

This Assessment Report provides the basis and findings of the Conceptual stage assessment by NDA Radioactive Waste Management Directorate (hereafter RWMD) of the proposed designs of waste container with regard to their potential to manufacture disposable waste packages. The assessment has been carried out through the Disposability Assessment Process¹, whereby RWMD examines the disposability of proposed waste packages by assessment against published packaging specifications and the underpinning geological disposal concept.

As the use of the 3m³ Safstore waste containers has been proposed without any specific description of the wastes that may be packaged within them, this assessment has primarily considered the compliance of the proposed waste container designs with those aspects of the *Generic Specification for waste packages containing low heat generating waste* which are pertinent to waste containers. However, it also includes a consideration of the issues that would need to be addressed by users of the containers, especially regarding the information that would be required as part of a submission for a subsequent Disposability Assessment of any proposals to use the containers for the packaging of ILW and other low heat generating waste.

Background

Croft is developing a range of ductile cast iron waste containers designed for the packaging of the ILW that would arise from the decommissioning and clean-up of NDA and other UK nuclear sites. The nature of these containers is such that they are intended to be used to manufacture 'robust shielded waste packages' in which the waste container is sufficiently physically robust such that it provides most of the required performance of the waste package without explicitly relying on any specific properties of the contents. A consequence of this is that it permits such waste containers to be used for the packaging of suitable wastes in a non-encapsulated form. It is intended that the proposed waste containers will be capable of providing adequate radiation shielding to enable the resultant waste packages to be stored in a lightly shielded facility and, in some cases, to be transported through the public domain without additional protection. The suitability of the proposed waste

¹ For further information on the LoC process, reference should be made to *Guide to the Letter of Compliance Process*, NDA Document WPS/650, March 2008.

containers to be used for the manufacture of robust shielded waste packages is therefore a key aspect of this assessment.

Scope of assessment

This Conceptual stage Disposability Assessment is limited to a consideration of the suitability of the proposed designs of 3m³ Safstores to manufacture waste packages that are compliant with the requirements for safe transport to and disposal in a geological disposal facility.

Croft has proposed four basic variants of 3m³ Safstore, three of which are dimensionally compliant with existing standardised designs of waste container. All four variants possess external dimensions that would permit their transport in existing designs of standard waste transport container, as Type B transport packages.

Outcome of assessment

Compliance with the RWMD packaging specifications

The assessment has shown that all of the proposed designs of 3m³ Safstore are compliant with the container related requirements as defined by the Generic Specification for waste packages containing low heat generating waste. It has also been shown that, if suitable controls were placed on their contents, they would be capable of producing waste package which would be compliant with all of the requirements of that specification.

Compliance with the geological disposal concept

The assessment has shown that the external dimensions and lifting features of the -R, -S and -C variants of the 3m³ Safstore are compliant with Level 3 Waste Package Specifications (WPS) produced for the two variants of the 3 cubic metre box waste container (the -R variant being compliant with WPS/310 and the -S and -C variants being compliant with WPS/315) that are identified by the Disposal System Technical Specification (DSTS) as being suitable for the packaging of ILW. As a consequence the waste packages that could be manufactured using the 3m³ Safstores could be compliant with the current geological disposal concept, if suitable controls were placed on their contents.

It is noted however, that the masses of the empty 3m³ Safstores are such that their use for the packaging of typical ILW could result in waste packages with gross masses well in excess of that specified for 3 cubic metre box waste packages (i.e. 12t).

It is also noted that neither the external dimensions nor the lifting feature defined for the -M variant of the 3m³ Safstore are compliant with either variant of the 3 cubic metre box waste container, in that they are based on those assumed for the Sellafield Miscellaneous Beta Gamma Waste Store (MBGWS) Box. Whilst the MBGWS Box is included in the DSTS, no Level 3 WPS exists for such waste packages as no endorsement of this container design, or of any plans to use it for the packaging of waste for geological disposal, has been provided by way of a Disposability Assessment. It is also likely that all waste packages manufactured using the -M variant would have gross masses in excess of 12t.

The suitability of any of the 3m³ Safstores to be used for the packaging of waste for disposal in a geological disposal facility (GDF) is being considered by way of the Disposal System Change Management process. Full compliance of all of the variants of the 3m³ Safstore with the geological disposal concept will have to be demonstrated in this manner before the endorsement of their designs can be made at the Interim stage.

Conclusions

The assessment has concluded that the proposed designs of 3m³ Safstore are sufficiently compliant with the relevant Level 2 Generic Specification, and with plans for geological disposal, to permit Conceptual stage LoCs to be issued endorsing their designs. Such endorsement is however currently limited to their use for the manufacture of waste packages with gross masses of no greater than 12t. Use of the containers is also subject to the waste they would contain possessing suitable properties, which would be judged as part of Disposability Assessments of proposals to use them for the packaging of actual wastes. It is noted that a 12t limit on waste package gross mass would effectively preclude the use of 3m³ Safstores with wall thicknesses of greater than 50mm for the packaging of most types of ILW.

The 'non-standard' nature of the 3m³ Safstores is such that they will add complexity to RWMD's plans for the geological disposal of low heat generating waste. Accordingly, RWMD is considering, by way of the Disposal System Change Management process, whether the proposed waste containers could be safely incorporated into the geological disposal concept. RWMD will also have to ascertain whether there would be a net benefit to the NDA in adopting the 3m³ Safstores as standardised designs of waste container. This was not evaluated as part of this 'container only' Disposability Assessment but it will form an important part of any future assessment of any proposed use of 3m³ Safstore containers for the packaging of actual waste.

The evaluation of the changes that would be necessary to the geological disposal concept to permit the disposal of 3m³ Safstore waste packages has progressed to a point where Conceptual stage LoCs can be issued to endorse each of the four designs of 3m³ Safstore.

Such endorsement is caveated to limit the use of the 3m³ Safstore waste containers for the manufacture of waste packages:

- (i) with gross masses of no greater than 12t;
- (ii) containing wasteforms with such properties as to ensure their compliance with the safety cases for transport and disposal; and
- (iii) containing encapsulated waste, or waste with an activity content sufficiently low to permit the existing SWTC containment methodology to be applied to demonstrate adequate transport package performance during transport impact accidents.

If the Disposal System Change Management process can show that a case can be made for the adoption of waste containers with the dimensions and properties of the 3m³ Safstores as standardised designs of waste container, Level 3 WPS would be developed for the waste packages that could be manufactured using them. This would permit Interim stage Disposability Assessments of the 3m³ Safstore designs to be carried out.

This Assessment Report identifies a total of 15 Action Points which will require to be addressed before a submission for an Interim stage Disposability Assessment. Thirteen of these Actions Points are concerned with the waste container designs themselves, and highlight the need for additional information on the designs and the properties of the material to be used for their fabrication (e.g. corrosion performance, low temperature ductility etc). The Action Points also include a need for information on the expected impact and fire accident performance of the 3m³ Safstores. In the case of impact accident performance this could have significance for the potential use of the containers, and the height to which 3m³ Safstores waste packages could be stacked at a GDF. The remaining two Action Points deal with the need for

information on the expected performance of 3m³ Safstore waste packages during transport and following receipt at a GDF.

It is recommended that prior to the submission of proposals to use of the 3m³ Safstores for the packaging of specific wastes, Interim stage endorsement of the container designs should be obtained. Such endorsement will require the adequate resolution the Action Points referred to above, to permit compliance with the container related factors in the relevant Level 3 WPS to be demonstrated.

The Disposability Assessment of packaging proposals could then result in the endorsement of proposed waste packages at any of the three assessment stages (i.e. Conceptual, Interim or Final). The choice of stage will depend on the degree of development of the packaging proposal and the nature and level of characterisation of the waste to be packaged.