A COMPANY STANDARD FOR STORAGE CONTAINERS

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ABSTRACT

For most organisations that carry out their business in the field of nuclear engineering it is necessary to safely store radioactive material items either before, during or after their production process.

Assuming that materials have been delivered/ received in approved transport packaging (most likely meeting IAEA Transport Package standards), the responsibility for safe storage within the company lies with the storage facility managers. Obviously there is national legislation/ regulation in terms of facility or site license conditions and in the UK the Ionising Radiations Regulations that ensure that workers are not exposed to excessive dose in terms of radiation and contamination.

This paper describes the evolution of a Storage Design Approval Requirements (DAR) document that was introduced in the 1990's and is used to set the standards for storage containers on our site. The paper will cover the background to the introduction of the DAR and describe how a risk based approach was adopted with the activity thresholds set for different storage container classes in terms of activity and the forms of materials being stored.

The paper will discuss the advantages of implementing the standard and how it has evolved to provide the necessary flexibility to allow legacy/ waste items to be stored as either an interim measure, until further processing can be carried out, or a waste disposal route is developed/ identified.

INTRODUCTION

AWE play a crucial role in the defence of the United Kingdom and is the home of the UK's Nuclear Deterrent, where we build and maintain warheads for Trident, a submarine launched ballistic missile.

The company has been at the forefront of the UK Nuclear Deterrence programme for over 60 years delivering to the UK government and providing innovative solutions to National Nuclear Security and supporting the Continuous At Sea Deterrent (CASD).

A significant part of our role is the safe stewardship of national assets that include radioactive material in a variety of forms - for example

Raw materials
Components
Sub-assemblies
Process waste

Some items may only be stored for a relatively short period (weeks or months) but others require longer term storage and these can present their own challenges.

BACKGROUND

Historically facilities at AWE stored radioactive items in various containers after carrying out a risk assessment and ensuring compliance with national legislative requirements.

It was recognised that this approach could lead to duplication of design effort and that with no set standard, designs could vary significantly for similar risk payloads.

In 1994 a policy was implemented that required containers used to store radioactive materials to assessed/ approved by a safety panel.

A group of Subject Matter Experts were tasked with developing a Storage Design Approval Requirements (DAR) document using a risk based approach to enable flexibility and not over burden facility managers with unnecessary design requirements.

A rolling programme was implemented to assess/ approve existing designs against the new standard and all new designs were required to meet the requirements.

The general rule was that a storage container would not need to withstand accident conditions because they are stored in facilities that have their own safety case which consider such events.

WHERE DID WE START ?

For many years the IAEA regulations have provided a risk based approach to the design and performance standards for the Safe Transport of Radioactive Material.

These regulations provide sensible thresholds for low level and increased level hazardous quantities and forms of material.

AWE had a committee that reviewed and self-certified the lower category (IP/ Type A etc) transport packages. It was a logical extension for this committee to review and certify the storage arrangements.

Design requirements were divided into Class 1 and Class 2 storage containers using the IAEA A2 value as a threshold but recognising that risks and accident withstand of the storage packages needed to be tailored to the risks associated within the storage facilities.

More recently the original certifying committee function has been transferred to the design and certification group with a more robust stakeholder review process to ensure that standards are maintained.

HOW THE DESIGN APPROVAL REQUIREMENTS HAVE EVOLVED

Originally there were three basic classes of approval.

Exempt

No formal approval but must satisfy legislative requirements for small quantities of radioactive substances – this needs local RPA endorsment.

Class 1 a) and b)

Class 2

It became apparent over the years that some legacy items were impractical to attempt to align with the new design criteria.

There were also some forms of waste that needed to be stored in such a way to enable further conditioning for ultimate disposal.

These situations required two new categories as follows:

Facility Justified

Where it is not reasonably practicable to meet the design requirements then storage can be covered by a justification in the facility safety case.

Local Arrangement

Where a container fails to comply with design and test requirements, compensatory measures are introduced such that a level of safety is assured equivalent to that which would have been achieved by meeting the requirements in full.

Class 1 divided into 2 categories

Class 1a)

LSA I/ SCO I
Uranium Metal

Figure 1 – Typical Class 1a)

Must meet the general design requirements
but no performance testing required.

Class 1b)

LSAII and SCO II
Anything up to A2

(Note: waste exceeding A2 may be included if awaiting conditioning for disposal provided risk assessment demonstrates that the risks are tolerable).

Figure 2 – Typical Class 1b)

Meets the general design requirements
1.2m drop test and a compression test required (no unacceptable loss)

Class 2

Activity exceeding A2 value

Figure 3 – Typical Class 2

Must meet the general design requirements - be capable of sealing.

Penetration test, Drop tests and Compression test are required – must prove that design remains sealed after testing.

OVERVIEW OF HOW THE APPROVAL PROCESS WORKS

Requirements capture includes following stakeholders:

Technical Authority for materials components/ assemblies
Materials Science Group (compatibility, radiolysis etc)
Shielding and Criticality experts
Health Physics
Storage Facility representatives
Programme Managers

Designs are based on output from capture exercise.

Prototype designs constructed for testing and verification and validation if required.

Design Safety Assessment compiled to answer DAR requirements.

Final Design Review held

A Certificate of Design is issued to certify that the DAR and all stakeholder requirements have been met and confirms that due process has been followed.

The storage facility accepts the design for use via the facility change control process.

Storage approval period is normally 5 years.

Routine inspection reports are provided to the design and certification group to inform/ support re-approval. Significant concerns are reported for immediate investigation / remedial action.

Storage approval certificates are posted on the company intranet as a first port of call for potential storage container users.

SUMMARY

The introduction of the storage container Design Approval Requirements has :

Ensured consistency of storage container design/ certification across the company.

Enabled flexibility for legacy and existing designs.

Encouraged formal inspection/ surveillance reporting as a condition of continued approval.

Meant less duplication as designs are managed centrally.

Required all stakeholders to “buy in” to inform design decisions and supporting documentation.

Increased customer confidence with respect to how the assets are being controlled/ managed.