

THE UK PROCESS FOR ASSESSMENT OF ILW PACKAGING PROPOSALS

S. Barlow, A. McCall
Nirex

Curie Avenue, Harwell Didcot, Oxfordshire OX11 0RH U.K.

ABSTRACT

Nirex is the UK's waste management organisation with a mission to develop and advise on safe, environmentally sound and publicly acceptable options for the long-term management of radioactive materials. From April 2005, Nirex will be restructured as a Government owned body, independent of the nuclear industry and of the newly formed Nuclear Decommissioning Authority.

Standards and specifications for the packaging of intermediate level and long-lived low level radioactive wastes have been defined and issued by Nirex. Compliance of waste producers' packaging proposals with the Nirex standards and specifications is assessed as part of the "Letter of Comfort" (LoC) process. The standards and specifications and LoC assessments are based on Nirex's proposed long-term concept for intermediate level waste, the phased geological repository concept. Issue of a LoC signifies that the proposal is expected to produce packages that are compliant with the safety and environmental assessments that support the concept.

On 1 January 2004, improved regulatory arrangements for the conditioning of intermediate level waste on nuclear licensed sites were adopted in the UK. These have the effect of requiring the Environment Agency (England and Wales) and Scottish Environment Protection Agency (Scotland) to consider any proposals for packaging of intermediate level waste and to advise the site regulator, the Nuclear Installations Inspectorate, on the disposability of the conditioned packages proposed. These new arrangements build on the existing "Letter of Comfort" (LoC) process that has been operated by Nirex since the mid-1980s and require that all packaging proposals go through the Nirex LoC process as a key step in the overall regulatory process. In response to these new arrangements, Nirex is proposing to restructure the documentation produced as a result of the LoC process. It is proposed that an Assessment Report will be issued to meet the regulatory need for a disposability safety case, and the Letter of Comfort will be re-designated a "Letter of Compliance".

The improved regulatory arrangements also provide for the environment agencies to scrutinise Nirex's phased geological repository concept and the application of the LoC process. This is intended to improve confidence in the robustness of the LoC process.

INTRODUCTION

As from April 2005 UK Nirex will be reconstituted as a Government owned waste management organisation given responsibilities to advise on waste management options for radioactive materials. Nirex will be independent of the nuclear industry and the newly formed Nuclear Decommissioning Authority (NDA). As part of these functions Nirex will continue with its role of assessing and endorsing waste packaging proposals brought forward by UK nuclear site operators. This role was strengthened in January 2004, when support was provided by UK nuclear regulators, and brought into the regulatory arrangements for nuclear licensed sites.

This paper describes the standards and specifications for waste packaging defined by Nirex, the Nirex LoC assessment process and the manner in which it links into the revised regulatory arrangements. The paper concludes by describing the significance of the Letter of Comfort (or Letter of Compliance in the future) and of the associated package records, which will permit packaged wastes to be removed from storage and transferred to future phases of management including transport and potentially the Nirex phased geological repository concept.

BACKGROUND

Nirex was established in 1982 by the UK nuclear industry with the objective of developing a deep geological disposal facility for intermediate level and long-lived low level wastes. As part of this role Nirex developed a suite of

waste package specifications to define the packaging standards that should be utilised to produce waste packages that would be compatible with the planned repository.

Since the mid-1980's many waste producers in the UK have invested in new waste retrieval and packaging plants using the Nirex standards and specifications to guide the development of those plants. Nirex was not in a position to "accept" proposed waste packages but was able to indicate to the waste producer when proposed waste packages were compatible with the disposal concept being developed. This was signified by the issue of a "Letter of Comfort" (LoC).

During the early 1990's the LoC process matured such that the underlying assessments undertaken by Nirex were established on a more structured footing with detailed advice (Letter of Advice) being issued to waste producers highlighting further information needs or where further development or research was needed before a LoC could be issued. At this time the LoC process was also modified to integrate better with the implementation of a packaging plant project, with interactions happening at concept stage, pre-commitment and finally, before active operations.

As of April 2004 Nirex has issued 44 final stage LoCs covering some 22% of UK intermediate level waste.

REGULATORY ARRANGEMENTS

On 1 January 2004 improved regulatory arrangements relating to the conditioning of intermediate level wastes on nuclear licensed sites were adopted [1]. These revised arrangements require that safety cases covering the operation of plants built for the purposes of retrieval and conditioning of intermediate level waste, also address the disposability of the waste packages thus produced. This change gives increased confidence to regulators and other stakeholders that the long-term management of waste packages is considered before they are manufactured.

In order to service this new requirement, the Environment Agency of England and Wales and its counterpart in Scotland, the Scottish Environment Protection Agency are establishing Nuclear Waste Assessment Teams that will have a statutory role to advise the Nuclear Installations Inspectorate on waste package disposability. The revised arrangements are built around the Nirex LoC process, and the LoC assessment is recognised as the primary vehicle for demonstration of disposability. In order for the regulators to have confidence in the LoC and underlying assessments, Nirex and its technical assessments are now subject to a process of scrutiny by the NWAT. A series of scrutiny projects have been initiated and review reports of the findings will be produced and published.

The revised arrangements are recognised within the Government's updated policy on the decommissioning of UK nuclear facilities issued in September 2004 [2]. The policy statement covers all (existing and new) nuclear industry facilities and their sites. This includes power stations, other reactors, research facilities, fuel fabrication and reprocessing plants and laboratories on nuclear licensed sites. It also includes fusion research facilities and where appropriate facilities on sites owned by the Ministry of Defence, nuclear submarines and their liabilities. The policy update confirms that operators should continue to process decommissioning wastes in accordance with Letter of Comfort arrangements.

The improved regulatory arrangements are illustrated in Figure 1.

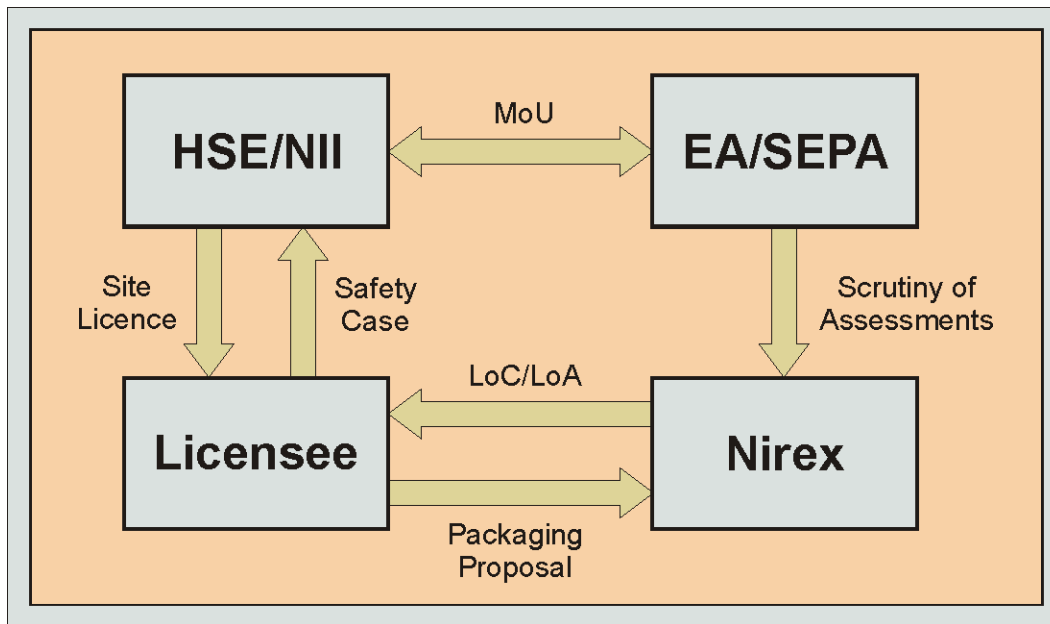


Fig. 1. Improved regulatory arrangements for ILW packaging

At the time of writing, NII, EA and SEPA are preparing guidance on the operation of the revised arrangements, to provide a further level of detail over and above that provided in the Position Statement [1]. This guidance is expected to be published in early 2005. Based on current understanding, the revised arrangements are expected to operate as described below.

Any waste producer or site operator wishing to package waste needs to engage with Nirex in the following manner:

- a) Production of a waste packaging submission for assessment by Nirex. The submission should describe the nature of the wastes and plans for retrieval, characterisation and assay, conditioning proposed and form of waste package. The packaging standards applicable to intermediate level wastes are defined by Nirex in its Waste Package Specification [3]. The Waste Package Specification is supported by various guidance documents.

Nirex would normally expect to see three stages of submission corresponding to three major phases of the waste packaging project. At concept stage, when a preferred option has been identified; at pre-commitment stage before construction contracts are let; and finally before the plant goes active.

- b) Nirex will undertake assessment of the proposal, judging the waste package for compatibility against the phased geological repository concept. Nirex has published a series of safety and environmental assessments that support the concept, and these form the technical underpinning of the assessment. The NWAT is scrutinising these assessments to give confidence in the robustness of the Nirex approach.
- c) Historically Nirex would respond to the submission with an Advice Report providing advice to the operator as to where further information is required, or detailing the need for further research and/or development. In cases where the proposal was judged to produce waste packages that were compliant with the Nirex concept, a Letter of Comfort could be issued. The LoC would be concept stage, interim or final stage.
- d) In response to the revised arrangements, Nirex is reviewing the form of documentation that should be provided as a result of the assessment process. Given that the focus is now to address the needs of a disposability safety case, Nirex is planning to revise the documentation produced as a result of the assessment process as follows:

- a Covering Letter;
- an Executive Summary of the assessment for publication;
- where appropriate, a Letter of Compliance – a new style LoC signifying that the proposed waste package is compliant with the Nirex concept;
- an Assessment Report, comprising
 - executive summary
 - disposability case - describing assessment of the proposal against Nirex assessments for transport, operations and post-closure.
 - advice - describing further information needs, or the need for further research and/or development (as existing advice report).
- Supporting safety and other assessments.

The new form of documentation is illustrated in Figure 2.

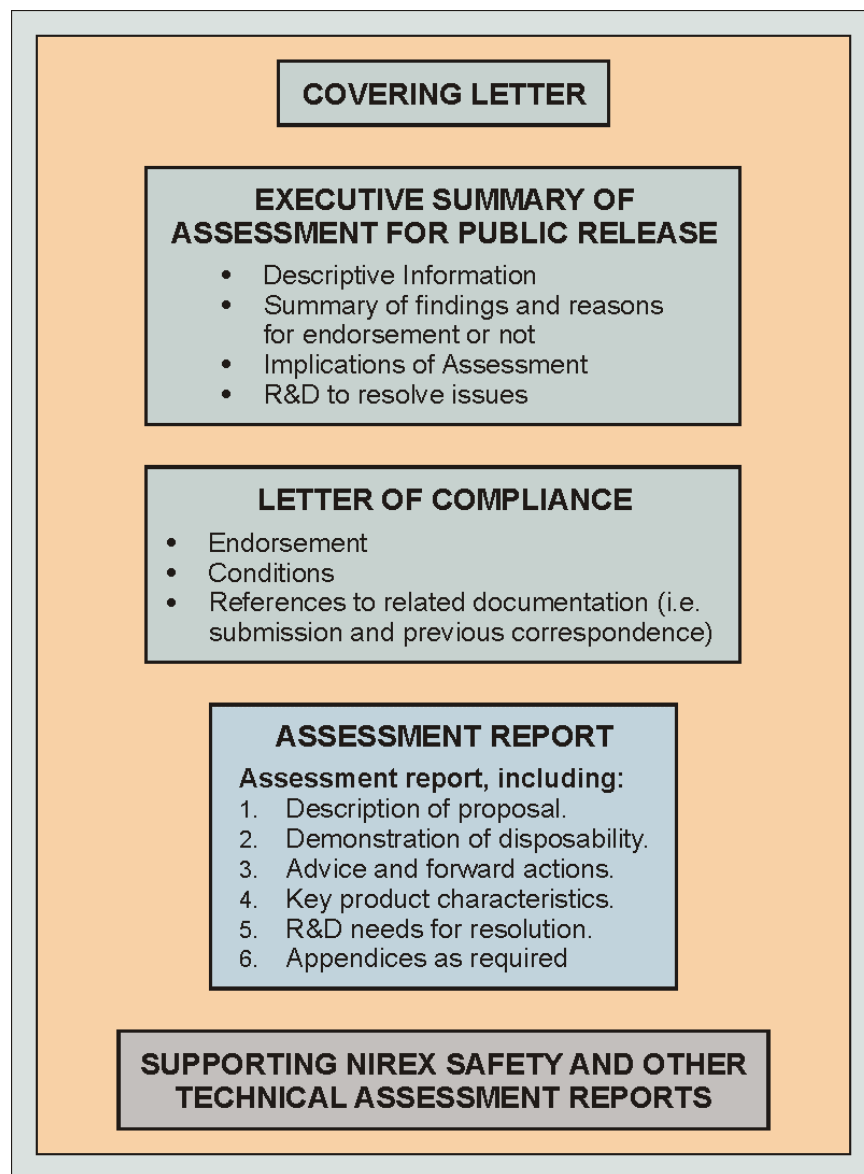


Fig. 2. Assessment output

THE NEW STYLE LETTER OF COMPLIANCE

The proposed Letter of Compliance is a development of, and would supersede, the Letter of Comfort, that Nirex has hitherto issued. The change in name from Letter of Comfort, to Letter of Compliance, is intended to give greater clarity as to the form and significance of the endorsement being offered. The Letter of Compliance signifies that the proposed waste packages have been assessed and judged to be compliant with the Nirex phased geological repository concept as defined within published generic design and safety and environmental assessments.

The Position Statement highlights that there may be exceptional situations where short-term safety or environmental considerations dictate that wastes should be retrieved and conditioned even if the waste producer has not yet satisfied all of the disposability criteria determined by Nirex. Thus using the new terminology, the site operator may be in receipt of an Assessment Report but may not have achieved a Letter of Compliance. In such a case, the Assessment Report takes on increased importance as this document will provide the vehicle to understand in what ways the waste packages fall short of the normal expected packaging standards. The Report should identify and describe the so-called “compliance gap”. Armed with this information the regulator will be in a position to understand the limitations of the proposed waste package and of the consequences in terms of future rework, if the decision is taken to go-ahead with waste package production.

It should be emphasised that the Letter of Comfort, and its successor the Letter of Compliance is not, and cannot be a guarantee that a waste package will be accepted into a future repository. Acceptance criteria for such a facility can only be confirmed when the facility has been built and licensed by the authorities. However the Letter of Compliance does give confidence to the site operator that the waste package has been assessed by an independent waste management organisation, and has been found to be compliant with the repository concept as presently understood.

The packaging standards and specification and underpinning safety and environmental assessments are based on a generic design and generic UK site. This means that the design and safety assessments have been established against a wide safety envelope that could be adopted at a range of sites in the UK. The eventual acceptance criteria are expected to fall within the bounds of the defined generic envelope, which has been specifically designed to incorporate margins for safety. As the concept is developed and becomes site-specific, the margins for safety can be re-evaluated and the packaging criteria made less generic and closer to the eventual waste acceptance criteria.

Nirex has also taken steps to examine the robustness of the LoC process to the uncertainty posed by the review of long-term radioactive waste management options initiated by Government in 2001 [4]. The Committee on Radioactive Waste Management (CoRWM) is currently reviewing the various options for the long-term management of the long-lived radioactive materials that exist in the UK. The CoRWM will provide a recommendation to Government in mid-2006. Given that the Nirex concept of the phased geological repository has yet to be endorsed by Government policy, Nirex has examined its waste packaging standards and assessed them for compatibility with other potential waste management options. The Nirex analysis has been reviewed by the Government's Radioactive Waste Policy Group which found a good level of compatibility [5]. The RWPG report stated;

“The conclusions of this workshop ... provide confidence that all ILW can be packaged using the Nirex LoC process during CoRWM's deliberations.”

PRODUCTION OF THE “PACKAGE RECORD”

We have seen that the revised arrangements will place particular emphasis on the Assessment Report proposed by Nirex, as it is this document that will provide the disposability component of the overall safety case. The Letter of Compliance, on the other hand is intended to provide a visible and immediate demonstration of disposability that will perhaps, be more meaningful to other stakeholders. The LoC is however one just component of the “package record” that will be accumulated by the waste package throughout its lifetime encompassing the phases of development, manufacture, interim storage, transport and potentially emplacement, in the phased geological repository proposed by Nirex.

The various phases during the lifetime of a waste package are illustrated in Figure 3.

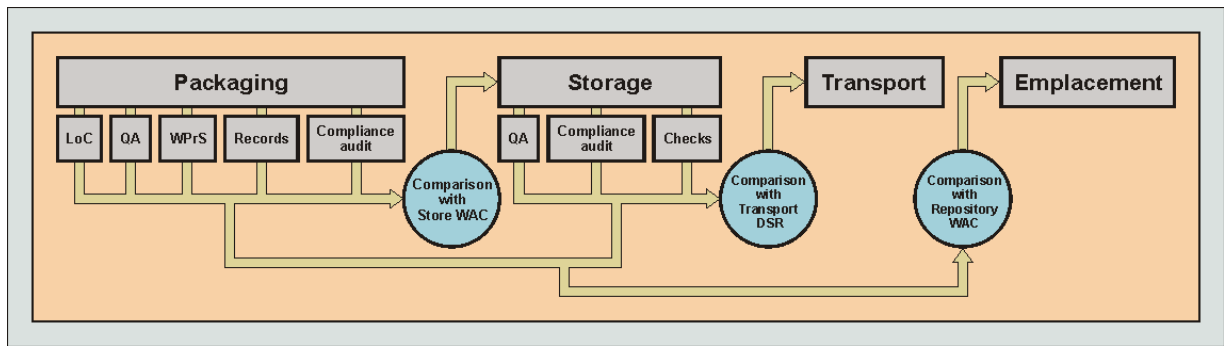


Fig. 3. Role of package record in waste acceptance

A number of key components of the package record are outlined below:

- Letter of Compliance – provides link to the detailed assessments undertaken, and the disposability safety case;
- Waste Product Specification (WPrS) – the specification of what the waste producer is setting out to achieve and which is assessed under the LoC process;
- Data records – the LoC process ensures that the appropriate records are kept based on measurement, assay or existing records to demonstrate conformance, or not, with the WPrS and basis of the LoC assessment;
- Quality assurance (QA) system – development and production of the waste package is undertaken under appropriate quality management system;
- Compliance audit – regulators check that the producer makes the waste package that they set out to make.

Following manufacture, it is expected that the waste package will be subject to a period of storage, probably on the same site. At some stage in the future it is likely that there will be a desire to transport the package either to another store, or to a long-term management facility such as the phased geological repository facility proposed by Nirex. If these subsequent phases are to be achieved then it will be important to be able to demonstrate that the package record is correct, and has been maintained and updated as appropriate based on periodic waste package monitoring and checking. All the important elements referred to in Figure 3 are dealt with either within the scope of Nirex packaging specifications or within the LoC process itself. A key issue that is being developed currently is the mechanism by which the Letter of Compliance is subject to periodic update and review. It is currently envisaged that a number of review triggers will be defined to give confidence regarding continued currency and to protect the site operator's (or the NDA's) investment.

KEEPING THE PUBLIC INFORMED

Nirex has for several years attempted to put the public interest at the forefront of its agenda. This will take on increased importance given the new Government owned and independent structure and remit of Nirex.

As part of the revised regulatory arrangements Nirex is committed to keeping the public and stakeholders informed of progress that is being made in recovering and packaging intermediate level wastes. Nirex has for several years now published an annual résumé of interactions on waste packaging matters, in particular where Letters of Comfort and/or Advice have resulted [6].

In the future it is proposed that this approach will continue and will be strengthened by the publication of summary details of each Assessment Report issued. These will be written in an accessible form suitable for a wide readership and are proposed to be made available on the Nirex website (www.Nirex.co.uk). Where information supplied as an input to the LoC process is of a commercial or sensitive nature, this will of course be respected within the summary information supplied.

REFERENCES

- 1 Improved regulatory Arrangements for the Conditioning of ILW on Nuclear Licensed Sites. Regulators' Position Statement – December 2003.
- 2 HM Government, The Decommissioning of the UK Nuclear Industry's Facilities, policy statement, September 2004.
- 3 Nirex, Generic Waste Package Specification, Nirex Report N/104, 2005.
- 4 HM Government, Managing Radioactive Waste Safely, Proposals for developing a policy for managing solid radioactive waste in the UK, 2001.
- 5 Defra, Report on RWPG sponsored compatibility workshops DEFRA/RAS/04.007, 2004.
- 6 Nirex, Nirex Interactions with Waste Producers on plans for Packaging Radioactive Waste – April 2002 to March 2003, Nirex Report N/114, 2004.