

**WASTE PACKAGE SPECIFICATION AND
GUIDANCE DOCUMENTATION**

**WPS/100: Introduction to the Waste Package
Specification and Guidance Documentation**

**March 2008
Number: 8764726**

**WASTE PACKAGE SPECIFICATION AND
GUIDANCE DOCUMENTATION**

**WPS/100: Introduction to the Waste Package
Specification and Guidance Documentation**

**March 2008
Number: 8764726**

Conditions of Publication

This report is made available under the NDA Transparency Policy. In line with this policy, the NDA is seeking to make information on its activities readily available, and to enable interested parties to have access to and influence on its future programmes. The report may be freely used for non-commercial purposes. However, all commercial uses, including copying and re-publication, require permission from the NDA. All copyright, database rights and other intellectual property rights reside with the NDA. Applications for permission to use the report commercially should be made to the NDA Information Manager.

Although great care has been taken to ensure the accuracy and completeness of the information contained in this publication, the NDA can not assume any responsibility for consequences that may arise from its use by other parties.

© Nuclear Decommissioning Authority 2008. All rights reserved.

Bibliography

If you would like to see other reports available from NDA, a complete listing can be viewed at our website www.nda.gov.uk, or please write to the Library at the address below.

Feedback

Readers are invited to provide feedback to the NDA on the contents, clarity and presentation of this report and on the means of improving the range of NDA reports published. Feedback should be addressed to:

John Dalton,
Head of Communications,
NDA Harwell
Radioactive Waste Management Directorate
Curie Avenue,
Harwell,
Didcot,
Oxon,
OX11 0RH, UK.

john.dalton@nda.gov.uk

WASTE PACKAGE SPECIFICATION AND GUIDANCE DOCUMENTATION
INTRODUCTION TO THE WASTE PACKAGE SPECIFICATION AND GUIDANCE
DOCUMENTATION

This document forms part of a suite of documents prepared and issued by the Radioactive Waste Management Directorate (RWMD) of the Nuclear Decommissioning Authority (NDA).

The Waste Package Specification and Guidance Documentation (WPSGD) provide specifications and guidance for waste packages, containing Intermediate Level Waste and certain Low Level Wastes, which meet the transport and disposability requirements of geological disposal in the UK. They are based on, and are compatible with, the Generic Waste Package Specification (GWPS).

The WPSGD are intended to provide a 'user-level' interpretation of the GWPS to assist Site License Companies (SLCs) in the early development of plans and strategies for the management of radioactive wastes. To aid in the interpretation of the criteria defined by the WPSGD, and in their application to proposals for the packaging of wastes, SLCs are advised to contact RWMD at an early stage.

The WPSGD will be subject to periodic enhancement and revision. SLCs are therefore advised to contact RWMD to confirm that they are in possession of the latest version of any documentation used.

WPSGD DOCUMENT NUMBER WPS/100 - VERSION HISTORY		
VERSION	DATE	COMMENTS
WPS/100/01	March 2005	Aligns with GWPS (Nirex Report N/104) as published June 2005
WPS/100/02	October 2007	Responsibility for the WPSGD passed to the NDA RWMD. Aligns with Issue 2 of GWPS (Nirex Report N/104) as published March 2007. Changes comprise: Inclusion of WPS and Guidance for the corner lifting variant of 3 cubic metre Box - WPS/315 and WPS/715) Inclusion of additional Thematic Guidance (WPS/901-903, 907 and 908)
WPS/100/03	March 2008	Issued to coincide with complete re-issue of WPSGD. Includes additional WPS/900 Series documents.

This document has been compiled on the basis of information obtained by Nirex and latterly by the NDA. The document was verified in accordance with arrangements established by the NDA that meet the requirements of ISO 9001. The document has been fully verified and approved for publication by the NDA.

1 INTRODUCTION

The Radioactive Waste Management Directorate (RWMD) of the Nuclear Decommissioning Authority (NDA) has been established with the remit to implement the geological disposal option for the UK's higher activity radioactive wastes. The NDA is currently working with Government and stakeholders through the *Managing Radioactive Waste Safely* (MRWS) consultation process to plan the development of a Geological Disposal Facility (GDF).

As the ultimate receiver of wastes, RWMD, acting as GDF implementer and future operator, has established waste packaging standards and defined package specifications to enable the industry to condition radioactive wastes in a form that will be compatible with future transport and disposal. In this respect RWMD is taking forward waste packaging standards and specifications which were originally developed by United Kingdom Nirex Ltd, which ceased trading on 1st April 2007 and whose work has been integrated into the NDA.

The primary document which defines the packaging standards and specifications for Intermediate Level Waste (ILW), and certain Low Level Wastes (LLW) not suitable for disposal in other LLW facilities is the Generic Waste Package Specification (GWPS) [1]. The GWPS is supported by the Waste Package Specification and Guidance Documentation (WPSGD), to which this particular document provides an introduction.

The WPSGD comprises a suite of documentation primarily aimed at waste packagers, its intention being to present the generic packaging standards and specifications at the user level. The WPSGD also includes explanatory material and guidance that users will find helpful when it comes to application of the specification to practical packaging projects.

2 BACKGROUND

2.1 The Concept of Geological Disposal

A key aspect in the production of standards and specifications for packaged waste is the definition of a disposal system which encompasses all stages of the long-term management of waste from retrieval through to final disposal.

In line with the MRWS consultation process, RWMD is continuing to develop concepts for the geological disposal for higher activity wastes which include ILW, and certain LLW not suitable for disposal in other LLW facilities¹. It is envisaged that the geological disposal of such wastes would comprise a number of distinct stages including:

- the retrieval and conditioning of the waste to create disposable waste packages, usually at the site of waste arising;
- a period of interim surface storage, also at the site of arising;
- transport of the waste packages to a GDF;
- transfer of waste packages underground and emplacement in disposal vaults;

¹ The generic description 'ILW' is used in the remainder of this document to describe both these categories of waste.

- a period of monitored storage underground, during which retrieval by relatively simple means would be feasible;
- backfilling of the disposal vaults, followed by eventual sealing and closure.

The timing and duration of each stage would depend on a number of criteria, including the geographical location and host geology of a GDF as well as the disposal concept selected for implementation.

The Phased Geological Repository Concept (PGRC) [2], has been developed as one manifestation of geological disposal and has been adopted as the reference concept for the purposes of establishing packaging standards. The PGRC is supported by a suite of safety, security and environmental assessments intended to demonstrate that this concept will provide safety to workers and the public and provide the necessary level of environmental protection.

The safety philosophy adopted in the PGRC, in common with other approaches to the geological disposal of radioactive waste, is one of containment of radionuclides by multiple barriers, of which that provided by the waste package is a key component. Included in these barriers are those provided by the waste package, which itself can be considered as two independent but complimentary barriers, the waste container and the wastefrom, each of which plays an important role in the containment of radionuclides.

As the MRWS consultation process continues it is anticipated that the siting process, based on expressions of interest from volunteer communities, may lead to the identification of sites for investigation as to suitability to host a GDF. The disposal concept design and safety case will be developed to suit the specific characteristics of the site and packaging standards will be updated to reflect the new circumstances as appropriate.

2.2 The Generic Waste Package Specification

A major area of the RWMD's work is the provision of advice to the packagers of radioactive waste in the UK, by way of the definition of packaging standards and the assessment of individual waste packaging proposals against those standards.

The primary document that defines packaging standards for ILW is the GWPS [1]. Derived from the PGRC and its associated generic documentation, which comprise the system specifications and safety assessments that define the PGRC, the GWPS provides the basis for assessing the suitability of waste packages containing ILW for disposal in a GDF.

The packaging standards defined by the GWPS are generic in two respects in that they are:

- derived from a full consideration of all future stage of long-term waste management; and
- independent of the location of the site of a GDF, which could be implemented at a range of different sites within the UK, representing a range of geological environments.

The purpose of the GWPS is to define:

- general requirements that are applicable to all waste packages;
- a range of standard waste containers;
- specific requirements for the standard waste package design that are created using the standard waste containers;
- requirements for the conditioned wastefroms that are placed into containers;

- requirements for quality management and for the creation and maintenance of records about each individual waste package.

The GWPS therefore defines the performance requirements for the two barriers to the release of radionuclides provided by the waste package, the waste container and the wasteform, against which the overall performance of waste packages can be assessed.

2.3 The Assessment of Packaging Proposals

Since the mid-1980s, waste producers in the UK have made significant investment in waste retrieval and packaging plant as a means of ensuring that such wastes are rendered passively safe and suitable for disposal. Historically Nirex was responsible for the assessment and endorsement of the suitability of packaging processes for this latter need, originally by way of the 'Letter of Comfort' assessment process. Over the ensuing two decades the Letter of Comfort process has developed and matured to a point that the assessments undertaken were established on a more structured footing with detailed advice being issued to waste producers highlighting further information needs, or need for further development and/or research before a Letter of Comfort could be issued. The assessment process was also modified to integrate better with the implementation of packaging plant projects, with staged interactions occurring at a number of stages before active operation of a packaging plant commenced. The status of the assessment process was strengthened in January 2004, when support was provided by UK nuclear regulators, and it was recognised within improved regulatory arrangements for nuclear licensed sites [3]. This was accompanied by significant changes to the assessment process which was renamed the 'Letter of Compliance' assessment process, a full description of which can be found in *Guide to the Letter of Compliance Assessment Process, WPS/650*.

In April 2007 Nirex was dissolved and its responsibilities assumed by RWMD. This included the role of assessing and endorsing nuclear site operators' waste packaging proposals through the LoC assessment process.

In undertaking LoC assessments RWMD determines whether wastes, when packaged, will have characteristics compliant with plans for transport to, and operations at a GDF, and ultimately whether the wastes could be accommodated within a GDF long-term post-closure safety case. The main output of a LoC assessment is an Assessment Report which may be accompanied by the issue of a LoC endorsing the packaging proposal. In line with the recently updated regulatory guidance [4] such endorsement is now seen by the regulators as an important component of the operator's Radioactive Waste Management Case.

3 THE DEFINITION OF STANDARD WASTE PACKAGES

The GWPS defines a limited range of standard waste containers which are suitable for packaging the variety of wastes expected to arise within the UK. Such standardisation is important as it enables package handling, transport and the operational period of a GDF to be optimised around a limited number of variants with subsequent safety, throughput and cost benefits.

The five standard waste containers are:

- 500 litre Drum;

WPS/100/03
March 2008

- 3 cubic metre Box²;
- 3 cubic metre Drum;
- 4 metre Box;
- 2 metre Box.

The waste packages that are created with these containers when filled with conditioned waste comprise two basic types:

- **Unshielded waste packages** (500 litre Drum, 3 cubic metre Boxes, 3 cubic metre Drum) are typically manufactured from stainless steel. Such material provides little radiation shielding and remote handling of unshielded waste packages is usually required to provide radiological protection.

For similar reasons, unshielded waste packages must be transported through the public domain in reusable shielded transport containers, the combination of transport container and waste packages being usually classed as a Type B transport package under the IAEA Transport Regulations [5].

- **Shielded waste packages** (4 metre and 2 metre Box) are manufactured from stainless steel and, where necessary, have built-in shielding and/or contain low-activity materials, such that they do not need remote handling techniques.

As well as being disposal packages they are transport packages in their own right, designed to meet the requirements of Industrial Package Type 2 (IP-2) freight containers as specified by the IAEA Transport Regulations [5]. This limits the allowable contents of shielded waste packages to materials that qualify as Low Specific Activity (LSA) material and/or Surface Contaminated Objects (SCO).

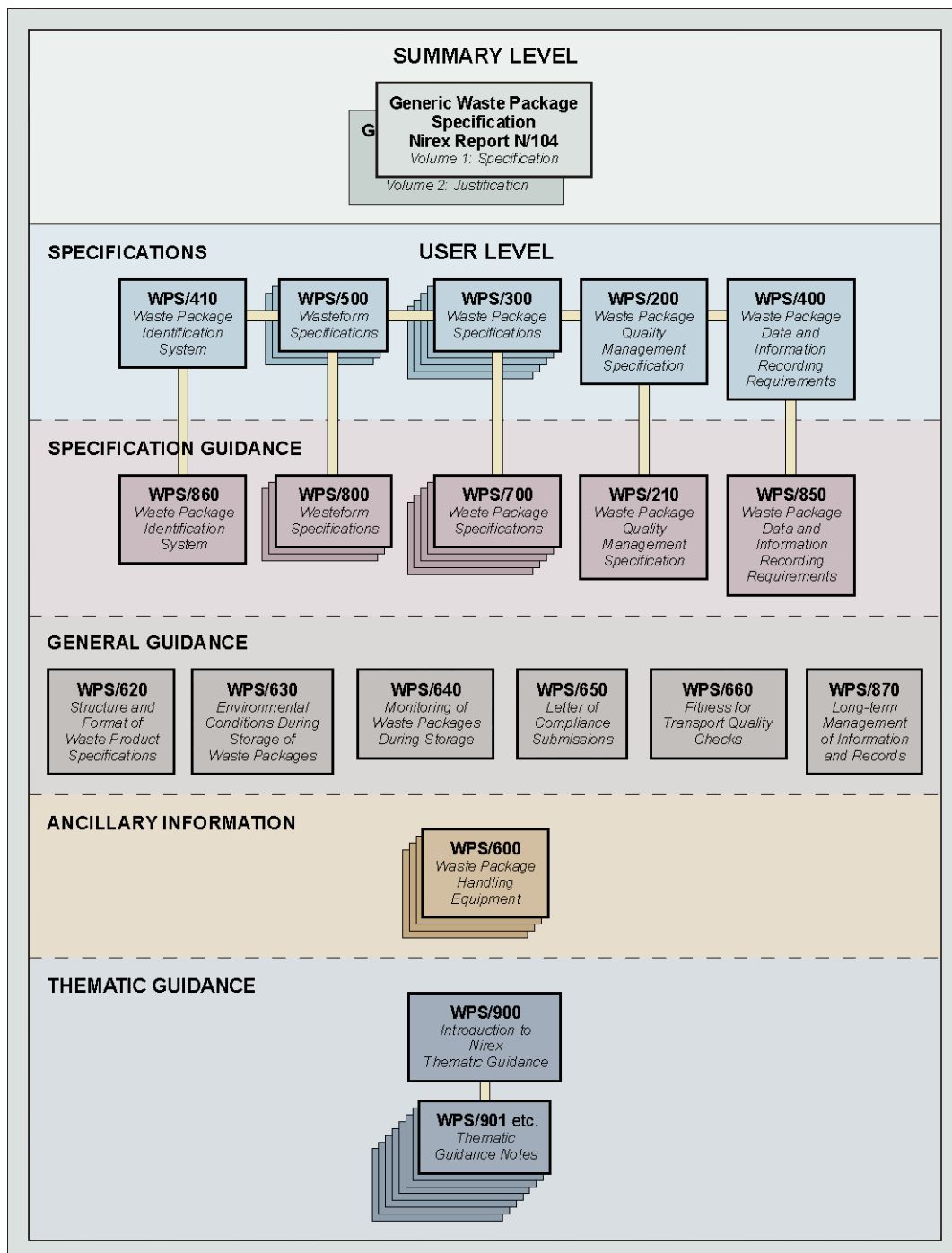
In addition to the standard waste packages, a limited number of non-standard waste packages have been accepted for packaging specific waste streams, most often because the packaging concepts pre-date the standard range of containers, but also for discrete items that cannot be packaged into standard waste containers. However, non-standard packages still have to satisfy, to an equivalent level, the same performance requirements as those defined for standard waste packages by the GWPS.

4 STRUCTURE OF THE WPSGD

The WPSGD is a suite of documents derived directly from the GWPS. The specification requirements included in the GWPS are presented in the WPSGD in the form of specifications for each of the standard waste packages. Figure 1 illustrates the relationship between the GWPS and the WPSGD and shows the structure of the latter. A full list of the documents that make up the current WPSGD can be found in Appendix A.

² Two distinct variants of the 3 cubic metre Box exist. A number of variations exist between the two variants and, accordingly, individual specifications are produced for each variant.

Figure 1 The Structure of the WPSGD



The WPSGD comprises of five different types of document:

- Specifications;
- Specification Guidance;
- General Guidance;
- Ancillary Information
- Thematic Guidance.

4.1 Specifications

The specifications provide a high-level definition of the key features and minimum performance requirements for the specific area covered. Specifications in most areas, are not mandatory (Waste Package Identification and Quality Management excepted) and scope does exist for relaxation of the standard criteria as credit can often be given to other compensating factors. Specifications should be used as the basis for developing packaging strategies for discussion with RWMD prior to the submission of packaging proposals and during the LoC assessment process.

4.1.1 Waste Package Specifications

Series 300 comprises a specification for each of the standard waste packages. Each specification defines the key features of the waste container for that package, outline criteria for the wasteform, and sets down minimum performance requirements for the complete waste package.

Criteria are specified for:

Activity content	Surface dose rate
Heat output	Surface contamination
Dimensions	Lifting features
Mass	Gas generation
Venting	Integrity
Properties of the Wasteform	Criticality safety
Impact performance	Fire performance
Stackability	Identification
Nuclear security physical protection	Safeguards

Series 300 comprises the following documentation:

<i>WPS/300</i>	<i>Specification for 500 litre Drum Waste Package</i>
<i>WPS/310</i>	<i>Specification for side-lifting variant of the 3 cubic metre Box Waste Package</i>
<i>WPS/315</i>	<i>Specification for corner-lifting variant of the 3 cubic metre Box Waste Package</i>
<i>WPS/320</i>	<i>Specification for 3 cubic metre Drum Waste Package</i>
<i>WPS/330</i>	<i>Specification for 4 metre Box Waste Package</i>
<i>WPS/350</i>	<i>Specification for 2 metre Box Waste Package</i>

4.1.2 Wasteform Specifications

The Series 300 waste package specifications include high-level criteria applicable to the wasteform. These are addressed in more detail by specific wasteform specifications. The wasteform specifications cover:

- immobilisation of radionuclides;
- mechanical and physical properties;
- chemical containment;
- hazardous materials;
- wasteform evolution;
- wasteform stability;
- gas generation.

Series 500 provides wasteform specifications for the standard waste packages:

WPS/500 Wasteform Specification for 500 litre Drum Waste Package

*WPS/510 Wasteform Specification for 3 cubic metre Boxes
and 3 cubic metre Drum Waste Packages*

WPS/520 Wasteform Specification for 4 metre and 2 metre Box Waste Packages

4.1.3 Quality Management Specification

WPS/200 Waste Package Quality Management Specification

In its role as a potential future operator of a GDF, and as the present-day specifier of packaging standards, RWMD needs to be confident that each waste package being produced will meet the agreed packaging intentions; and that following interim storage, each package will be acceptable for subsequent transport, handling and potential disposal.

Consistent with the good practise, a system of quality management is required to be applied to the packaging of waste that is to be emplaced in a GDF, the purpose being to provide the evidence which demonstrates that waste packages comply with a defined specification that can be assessed against future WAC.

This specification is mandatory and describes the quality management programmes and plans, the Waste Product Specification (WPrS) and the system of verification required to be put in place by the waste packager. The specification requires that for all activities affecting product quality, waste packagers demonstrate that quality management arrangements consistent with the specification are in place, that these arrangements are being implemented and that appropriate corrective actions have been taken where necessary. These arrangements will be independently assessed on behalf of RWMD or, alternatively, the waste packager may pursue certification by an accredited certification body.

4.1.4 Data and Information Recording Specification

WPS/400 Specification for Waste Package Data and Information Recording Requirements

The specification for the data and information recording requirements identifies the information on waste packages that will need to be obtained, recorded and maintained by waste packagers to support all future stages of the long-term management of waste packages.

4.1.5 Waste Package Identification System Specification

WPS/410 Specification for Waste Package Identification System

The specification for the waste package identification system defines the format of the unique identifier which is to be applied to each waste package destined for a GDF. The specification also defines the check algorithm which is used to generate 'check digits' which are incorporated within the identifier.

4.2 Specification Guidance

The brief and succinct specification documentation is supported by guidance documentation which is designed to be read in conjunction with the specifications. Such guidance material is available to accompany each of the specification documents listed in Section 4.1. The role of this guidance is to provide:

- explanatory information addressing the intent and rationale of the specification and focussing on what is required to meet the specification; and
- advisory information addressing how issues relating to the methods and technology may be employed to fulfil the technical requirements of the specification.

4.2.1 Waste Package Specification Guidance

Series 700 provides background information and justification of the specification criteria contained within the Series 300 waste package specifications together with advice on their interpretation and guidance on their implementation:

<i>WPS/700</i>	<i>500 litre Drum Waste Package Specification: Guidance Material and Design Guidelines</i>
<i>WPS/710</i>	<i>3 cubic metre Box Waste Package Specification: Guidance Material and Design Guidelines for side lifting variant</i>
<i>WPS/715</i>	<i>3 cubic metre Box Waste Package Specification: Guidance Material and Design Guidelines for corner lifting variant</i>
<i>WPS/720</i>	<i>3 cubic metre Drum Waste Package Specification: Guidance Material and Design Guidelines</i>
<i>WPS/730</i>	<i>4 metre Box Waste Package Specification: Guidance Material and Design Guidelines</i>
<i>WPS/750</i>	<i>2 metre Box Waste Package Specification: Guidance Material and Design Guidelines</i>

4.2.2 Wasteform Specification Guidance

Included within Series 800 is background information and justification of the Series 500 wasteform specifications:

<i>WPS/800</i>	<i>500 litre Drum Wasteform Specification: Explanatory Material and Guidance</i>
<i>WPS/810</i>	<i>3 cubic metre Boxes and 3 cubic metre Drum Wasteform Specification: Explanatory Material and Guidance</i>
<i>WPS/820</i>	<i>4 metre and 2 metre Box Wasteform Specification: Explanatory Material and Guidance</i>

4.2.3 Quality Management Specification Guidance

<i>WPS/210</i>	<i>Waste Package Quality Management Specification: Guidance Material</i>
----------------	--

4.2.4 Data and Information Recording Guidance

WPS/850 Waste Package Data and Information Recording Requirements: Explanatory Material and Guidance

4.2.5 Waste Package Identification System Guidance

WPS/860 Waste Package Identification System: Explanatory Material and Guidance

4.3 General Guidance

General guidance documentation has been produced where it is considered that waste packagers would benefit from further detailed information in specific areas. This guidance covers areas of direct relevance to waste package production, storage and transport.

- WPS/620 Guidance on the Structure and Format of Waste Product Specifications*
- WPS/625 Guidance on the Preparation of Criticality Compliance Assurance Documentation for Waste Packaging Proposals*
- WPS/630 Guidance on Environmental Conditions During Storage of Waste Packages*
- WPS/640 Guidance on Monitoring of Waste Packages During Storage*
- WPS/650 Guide to the Letter of Compliance Process*
- WPS/660 Guidance on Fitness for Transport Quality Checks*
- WPS/870 Long-term Management of Information and Records: Explanatory Material and Guidance*

4.4 Ancillary Information

Documentation containing ancillary information has been produced where it is considered that waste packagers would benefit from further detailed information in specific areas. The ancillary information is currently restricted to waste package lifting and handling equipment and is designed to provide package designers with further information on the waste package/lifting equipment interface. The scope of ancillary information documentation will be expanded as and when the need arises.

- WPS/600 500 litre Drum Waste Package Grab. Description and Design Guidelines*
- WPS/601 Lifting Frame for 3 cubic metre Box and 3 cubic metre Drum Waste Packages. Description and Design Guidelines*
- WPS/602 Lifting Frame for 4 metre Box Waste Package. Description and Design Guidelines*
- WPS/603 Lifting Frame for 2 metre Box Waste Package. Description and Design Guidelines*
- WPS/604 Lifting Frame for Stillage and corner lifting variant of the 3 cubic metre Box Waste Package. Description and Design Guidelines*

4.5 Thematic Guidance

Guidance on a wide range of 'thematic' waste packaging topics is in production and will be issued within the Series 900 Guidance Notes. The range of topics covered by this

WPS/100/03
March 2008

guidance is expected to increase over time as additional thematic packaging topics are identified.

As at the time of the publication of this version of WPS/100 the following Thematic Guidance Notes have been published:

- WPS/901 Guidance Note on the Use of Organic Polymers for the Encapsulation of Intermediate Level Waste*
- WPS/902 Guidance Note on the Packaging of Radon-generating Wastes*
- WPS/903 Guidance on the Immobilisation of Radionuclides in Wasteforms*
- WPS/904 Guidance on the Characteristics and Demonstration of Robust Formulation Envelopes for Cementitious Wasteforms*
- WPS/905 Guidance Note on the Packaging of Filters*
- WPS/906 Guidance Note on the Packaging of Sealed Sources*
- WPS/907 Guidance on the Packaging of Tritium Bearing Wastes*
- WPS/908 Guidance on the Preparation of Letter of Compliance Submissions*
- WPS/909 Guidance on the Scope of Periodic Review of Final Stage Letters of Compliance*
- WPS/910 Guidance on the Application of the IAEA criteria for Low Specific Activity Material to Waste Packages*
- WPS/911 Guidance on the application of the IAEA Transport Regulations 'fissile exceptions'*
- WPS/912 Guidance on the Sentencing of Non-compliant Waste Packages*
- WPS/913 Guidance on the Effective Implementation and Maintenance of a QMS for Waste Packaging*

APPENDIX A SUMMARY LIST OF CURRENT WPSGD

WPS/100	Introduction to the Waste Package Specification and Guidance Documentation
WPS/200	Waste Package Quality Management Specification
WPS/210	Waste Package Quality Management Specification: Guidance Material
WPS/300	Specification for 500 litre Drum Waste Package
WPS/310	Specification for side lifting variant of the 3 cubic metre Box Waste Package
WPS/315	Specification for corner lifting variant of the 3 cubic metre Box Waste Package
WPS/320	Specification for 3 cubic metre Drum Waste Package
WPS/330	Specification for 4 metre Box Waste Package
WPS/350	Specification for 2 metre Box Waste Package
WPS/400	Specification for Waste Package Data and Information Recording Requirements
WPS/410	Specification for Waste Package Identification System
WPS/500	Wasteform Specification for 500 litre Drum Waste Package
WPS/510	Wasteform Specification for 3 cubic metre Box and 3 cubic metre Drum Waste Packages
WPS/520	Wasteform Specification for 4 metre and 2 metre Box Waste Packages
WPS/600	500 litre Drum Waste Package Grab: Description and Design Guidelines
WPS/601	Lifting Arrangements for 3 cubic metre Box and 3 cubic metre Drum Waste Packages: Description and Design Guidelines
WPS/602	Lifting Arrangements for 4 metre Box Waste Package: Description and Design Guidelines
WPS/603	Lifting Arrangements for 2 metre Box Waste Package: Description and Design Guidelines
WPS/604	Lifting Frame for stillage and corner lifting variant of the 3 cubic metre Box Waste Package. Description and Design Guidelines
WPS/620	Guidance on the Structure and Format of Waste Product Specifications.
WPS/625	Guidance on the Preparation of Criticality Compliance Assurance Documentation for Waste Packaging Proposals
WPS/630	Guidance on Environmental Conditions During Storage of Waste Packages
WPS/640	Guidance on Monitoring of Waste Packages During Storage
WPS/650	Guide to the Letter of Compliance Process
WPS/660	Guidance on Fitness for Transport Quality Checks

WPS/100/03
March 2008

- WPS/700 500 litre Drum Waste Package Specification: Guidance Material and Design Guidelines
- WPS/710 3 cubic metre Box Waste Package Specification: Guidance Material and Design Guidelines for side lifting variant
- WPS/715 3 cubic metre Box Waste Package Specification: Guidance Material and Design Guidelines for corner lifting variant
- WPS/720 3 cubic metre Drum Waste Package Specification: Guidance Material and Design Guidelines
- WPS/730 4 metre Box Waste Package Specification: Guidance Material and Design Guidelines
- WPS/750 2 metre Box Waste Package Specification: Guidance Material and Design Guidelines
- WPS/800 500 litre Drum Wasteform Specification: Explanatory Material and Guidance
- WPS/810 3 cubic metre Box and 3 cubic metre Drum Wasteform Specification: Explanatory Material and Guidance
- WPS/820 4 metre and 2 metre Box Wasteform Specification: Explanatory Material and Guidance
- WPS/850 Waste Package Data and Information Recording Requirements: Explanatory Material and Guidance
- WPS/860 Waste Package Identification System: Explanatory Material and Guidance
- WPS/870 Long-term Management of Information and Records: Explanatory Material and Guidance
- WPS/901 Guidance Note on the Use of Organic Polymers for the Encapsulation of Intermediate Level Waste
- WPS/902 Guidance Note on the Packaging of Radon-generating Wastes
- WPS/903 Guidance on the Immobilisation of Radionuclides in Wasteforms
- WPS/904 Guidance on the Characteristics and Demonstration of Robust Formulation Envelopes for Cementitious Wasteforms
- WPS/905 Guidance Note on the Packaging of Filters
- WPS/906 Guidance Note on the Packaging of Sealed Sources
- WPS/907 Guidance on the Packaging of Tritium Bearing Wastes
- WPS/908 Guidance on the Preparation of Letter of Compliance Submissions
- WPS/909 Guidance on the Scope of Periodic Review of Final Stage Letters of Compliance
- WPS/910 Guidance on the Application of the IAEA criteria for Low Specific Activity Material to Waste Packages
- WPS/911 Guidance on the application of the IAEA Transport Regulations 'fissile exceptions'
- WPS/912 Guidance on the Sentencing of Non-Compliant Waste Packages
- WPS/913 Guidance on the Effective Implementation and Maintenance of a QMS for Waste Packaging

GLOSSARY OF TERMS

Cross-references to other definitions in this Glossary are in **bold**.

Activity

Activity is the rate of nuclear transformations or transitions occurring in a **radioactive** source. The SI unit of activity is the becquerel (Bq).

High Level Waste (HLW)

Wastes in which the temperature may rise significantly as a result of their radioactivity, so this factor has to be taken into account in designing storage or disposal facilities..

Industrial Package

A category of transport package defined by the IAEA **Transport Regulations** [5]. Industrial Packages may be classified as Type 1 (IP-1), Type 2 (IP-2) or Type 3 (IP-3). Industrial Packages are restricted to the carriage of **LSA** material and/or **SCO**.

Intermediate Level Waste (ILW)

Waste with a radioactivity content that exceeds either of the upper limits for **Low Level Waste**, but has lower radioactivity and heat output than **High Level Waste**.

Letter of Compliance (LoC)

A document, prepared by RWMD, that provides assurances to the waste packager that the waste package proposed is compliant with NDA packaging standards and specifications, as defined by the GWPS.

Low Level Waste (LLW)

Waste with a radioactivity content that is greater than Very Low Level Waste (i.e. wastes that are acceptable for disposal with household refuse), but does not exceed 4GBq/t of alpha radioactivity or 12GBq/t of beta/gamma radioactivity.

Low Specific Activity (LSA) material

A material classification defined by the IAEA **Transport Regulations** [5] as '*Radioactive material which by its nature has a limited specific activity (i.e. activity per unit mass of material), or radioactive material for which limits of estimated average specific activity apply.*'

Packaging

The preparation of radioactive waste for safe storage, transportation, handling and disposal by means of enclosing a **wasteform** in a suitable container.

Radioactive

Undergoing **radioactive decay**, usually accompanied by the emission of alpha, beta and/or gamma radiation.

Shielded waste package

A shielded waste package is one that either has in-built shielding or contains low activity materials, and thus may be handled by conventional techniques. In most cases, shielded waste packages are also designed to qualify as **transport packages** in their own right.

Surface Contaminated Object (SCO)

A material classification defined by the IAEA **Transport Regulations** [5] as 'A *solid object which is not itself radioactive but which has radioactive material distributed on its surfaces.*'

Transport container

In the context of the WPSGD: a container into which **unshielded waste packages** are placed for transport, the combination then qualifying as a **Type B Package** under the IAEA **Transport Regulations** [5].

Transport Regulations

The IAEA *Regulations for the Safe Transport of Radioactive Material* [5]; and/or those regulations as transposed into an EU Directive, and in turn into regulations that apply within the UK.

Type B Package

A category of transport package defined by the requirements of the IAEA **Transport Regulations** [5].

Unshielded waste package

An unshielded waste package is one that, owing either to radiation levels or containment requirements, requires remote handling and must be transported in a **transport container** (the container and contents then forming a **Type B** transport package).

Waste Acceptance Criteria (WAC)

Those criteria relevant to the acceptance of waste in to a specific storage or disposal facility.

Waste container

The vessel into which the **wasteform** is placed during manufacture of the **waste package**.

Wasteform

The waste in the physical and chemical form in which it will be disposed of, including any conditioning media and container furniture (i.e. in-drum mixing devices, dewatering tubes etc) but not including the **waste container** itself or any added inactive capping material.

Waste package

The **wasteform** and its **waste container**, as manufactured and prepared for all future aspects of waste management.

Waste Product Specification (WPrS)

A document prepared by the waste packager which describes the quality (properties and composition) and performance characteristics of each distinct type of **waste package** produced in a waste packaging plant.

Waste packager

In the context of the WPSGD, the waste packager is the organisation, possibly a SLC, that manufactures the **waste package**.

ABBREVIATIONS

GWPS	Generic Waste Package Specification
IAEA	International Atomic Energy Agency
ILW	Intermediate Level Waste
LLW	Low Level Waste
LoC	Letter of Compliance
LSA	Low Specific Activity
PGRC	Phased Geological Repository Concept
SCO	Surface Contaminated Object(s)
WAC	Waste Acceptance Criteria
WPrS	Waste Product Specification
WPSGD	Waste Package Specification and Guidance Documentation

5 FURTHER INFORMATION

For further information on waste packaging or to confirm the status of documents within the WPSGD, contact:

Brian Southgate

Waste Package Specification and Guidance Manager

NDA Harwell

Radioactive Waste Management Directorate

Curie Avenue

Harwell

Didcot

Oxfordshire OX11 0RH

Telephone : 01235 825427

Facsimile: 01235 825498

E-mail: brian.southgate@nda.gov.uk

REFERENCES

- 1 Nirex, *Generic Waste Package Specification*, Nirex Report N/104 Issue 2, 2007.
- 2 Nirex, *The Nirex Phased Disposal Concept*, Nirex Report N/074, 2003.
- 3 HSE/EA/SEPA, *Improved Regulatory Arrangements for the Conditioning of ILW on Nuclear Licensed Sites. Regulators' Position Statement*, 2003.
- 4 HSE/EA/SEPA, *The Management of Higher Activity Radioactive Waste on Nuclear Licensed Sites, Part I The Regulatory Process*, Guidance from the HSE, EA and SEPA to Nuclear Licensees, 2007.
- 5 IAEA, *Regulations for the Safe Transport of Radioactive Material, Requirements*, IAEA Safety Standards Series No. TS-R-1 (ST-1, Revised), 1996 Edition (Revised), 2003.

