

**WASTE PACKAGE SPECIFICATION AND
GUIDANCE DOCUMENTATION**

**WPS/400: Waste Package Data and
Information Recording Specification**

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Bibliography

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WASTE PACKAGE SPECIFICATION AND GUIDANCE DOCUMENTATION

WASTE PACKAGE DATA AND INFORMATION RECORDING SPECIFICATION

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/400 - VERSION HISTORY

VERSION	DATE	COMMENTS
WPS/400/01	March 2006	Aligns with GWPS (Nirex Report N/104) as published June 2005
WPS/400/02	March 2008	Responsibility for the WPSGD passed to the NDA RWMD. Aligns with Issue 2 of GWPS (Nirex Report N/104) as published March 2007. Minor updating changes incorporated.

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) which comprises a suite of documentation primarily aimed at SLCs, 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. For further information on the extent and the role of the WPSGD, reference should be made to the *Introduction to the Waste Package Specification and Guidance Documentation, WPS/100*¹.

In order that every waste package can be assessed against the requirements for safe and cost-effective handling, transport, storage and eventual disposal and, in particular, to demonstrate conformance with future Waste Acceptance Criteria (WAC) for the anticipated transport system and a GDF, and thus to obtain endorsement through issue of a Letter of Compliance (LoC), RWMD requires that waste packagers use all reasonable endeavours to acquire and record sufficient data and information for waste packages. This Specification provides a concise statement of those data and information recording requirements and is supported by *Waste Package Data and Information Recording Requirements: Explanatory Material and Guidance, WPS/850*, which provides interpretation of the Specification, so that the requirements may be satisfied in an optimal way.

¹ Specific references to individual documents within the WPSGD are made in this document in *italic script*, followed by the relevant WPS number.

2 AIMS

The Data Requirements section of the GWPS [1] identifies the information that will need to be made available by the waste packager to support all future stages of the long-term management of waste packages. Additional information must continue to be generated throughout the various stages management, but the reliability of the data at any moment rests upon the quality and integrity of all earlier data. The process must therefore begin with the design and production of each individual waste package.

It is therefore the aim of this Specification to facilitate the demonstration of conformance of waste packages with relevant legislation and regulatory guidance and to endeavour to ensure that waste packages - individually, in numbers and collectively - can be shown to meet the requirements for safe and cost-effective handling, transport, storage and eventual disposal. What needs to be recorded, therefore, are appropriate data that can be used as a basis to establish, infer or predict waste package properties and performance under the range of circumstances that will pertain during the various stages of their ong-term management.

The overall aims of the data and information recording requirements outlined in this Specification are that:

- a) Data shall be recorded for each waste package;
- b) Each waste package shall be readily identifiable, and shall be linked to data recorded about that waste package and also to the Waste Product Specification (WPrS) against which it was produced;
- c) The recorded data shall:
 - facilitate tracking of the location and status of each waste package at all times;
 - provide verification of conformance of a waste package with the relevant endorsement for disposability, and WPrS or identify areas of non-conformance;
 - enable demonstration of conformance with the IAEA Transport Regulations [2] (as implemented in UK legislation);
 - enable demonstration of conformance with the Waste Acceptance Criteria (WAC) for disposal which will, in turn, be substantially based on the associated regulatory permissions and supporting safety and environmental assessments covering operations and post-closure performance that underpin geological disposal;
 - facilitate provision of the disposal record.
- d) Of particular significance is a realistic and justifiable record of the nature and content of each waste package which:
 - covers the physical, chemical and radionuclide content;
 - identifies, or enables prediction of, waste package properties and performance;
 - allows prediction of the evolution of the waste package characteristics with time, and of the effect of interactions with other waste packages and the various components of a GDF.

3 IMPLEMENTATION

Each distinct type of packaged waste requires separate consideration in order to allow the development of a tailored system for data acquisition and recording. The system needs to cover the history of the packaged waste from the time of waste arising, through initial waste characterisation, waste package development, to package production, storage, transport and emplacement in a GDF.

It is important to develop and optimise the system, through consultation with RWMD, as part of the LoC process for assessing waste packaging proposals, and by reference to the requirements for all stages of long-term management. In this way, the data recording system for each distinct type of packaged waste can be optimised through provision of advice by RWMD on aspects such as the key data requirements, the accuracy required for quantitative data and identification of those data that need to be derived on a package-specific basis. Furthermore, the LoC submission documentation compiled for a packaging proposal² can itself be used as a valuable source of traceable data for waste packages. These aspects are discussed more fully in *WPS/850*, which should be consulted for further guidance.

4 SPECIFICATION FOR WASTE PACKAGE DATA AND INFORMATION

This section identifies the data and information that shall be obtained and recorded for each waste package.

4.1 Waste Package Identifier

- Unique waste package identifier (as detailed in *Specification for Waste Package Identification System, WPS/410*).

4.2 Waste

- Description of raw waste;
- Relevant UK Inventory Waste Stream Identifier³;
- Origin of the waste;
- Identity of storage facility for raw waste (if applicable).

4.3 Waste Container

- Type of waste container
- Waste container specification, including:
 - manufacturing drawings;

² See *Guidance on the Preparation of Letter of Compliance Submissions, WPS/908*, for details on the contents of such documentation.

³ Including identification of the version of the Inventory from which the Identifier is drawn.

- dimensions;
- material specifications;
- container storage conditions (prior to use).

4.4 Encapsulant, Capping and Conditioning Material

- Encapsulant, capping and conditioning material specification (as applicable), including:
 - chemical components;
 - relevant physical properties;
 - material storage conditions.

4.5 Wasteform Formulation

- Wasteform formulation, including (as applicable):
 - ratios of waste to encapsulant and conditioning materials;
 - ratios of components of the encapsulant, capping and conditioning materials;
 - envelope(s) of acceptable ratios.

4.6 Process Conditions

- Process conditions, including (as applicable):
 - component temperatures;
 - component addition regime;
 - mixing regime;
 - in-process movement times;
 - process verification steps.

4.7 Nature of the Waste Package

- Documentation providing evidence of waste package properties and performance, including (as applicable):
 - demonstration of conformance with the requirements for impact and fire performance;
 - thermal conductivity;
 - macro-voidage;
 - thermal, chemical, radiation and mechanical stability;
 - corrosion rates of waste package materials;
 - rates of gas generation and migration;
 - mobility of radionuclides;
 - compatibility with alkaline disposal environment;
 - arrangements for lid closure;
 - stability of filters and seals.

4.8 Waste Package Radionuclide Inventory

- Activities (TBq per waste package) of radionuclides present in significant quantities at a given reference date.
- Methodology statement describing the determination of waste package inventory.
- Physical and/or chemical form of radionuclides.

4.9 Wasteform Component Inventory

- Description of wasteform.
- Declaration that wasteform is free of proscribed materials or that hazardous materials have been made safe.
- Inventory of components present in significant quantities, including (as applicable):
 - radioactive material in particulate form;
 - encapsulant, capping and conditioning materials;
 - metals;
 - organic materials;
 - inorganic materials;
 - irradiated graphite.
- Methodology statement describing the determination of waste package inventory (wasteform components).

4.10 Waste Package Properties

- Specific Activity (GBq^{-1}).
- Gross mass (kg).
- Surface dose rate (mSv^{-1}).
- Non-fixed surface contamination levels (Bqcm^{-2}).
- Heat output (W), including non-radiogenic heat output.

4.11 Waste Product Specification

- WPrS in force (with any supporting documentation) at the time of waste package manufacture.
- Declaration of conformance or non-conformance with the WPrS.
- Verification of conformance or non-conformance with the WPrS.
- Details of non-conformance with WPrS.
- Details of remedial action taken in respect of a waste package initially deemed non-conforming with the WPrS.

4.12 Waste Package History

- Date of production of waste package.
- Identity of waste packaging plant(s).
- Identity of waste package store(s).

- Dates on which the waste package was placed in and removed from store(s).
- Storage environmental conditions.
- Checks on the condition of the waste package in store.
- Any abnormal occurrences or incidents involving waste package.
- Any remedial action(s) taken following inspection or abnormal occurrence.

4.13 Criticality Safety

- Criticality Compliance Assurance Documentation (CCAD) and appropriate criticality safety cases.
- Declaration of compliance or non-compliance with the CCAD.
- Verification of compliance or non-compliance with the CCAD.
- Details of any non-compliance of the waste package with the CCAD.
- Details of remedial action taken to establish as compliant a waste package that had been found non-compliant with the CCAD.

4.14 Administrative Information

- Waste owner contact.
- Waste owner authorisation and agreement for transfer of waste package for disposal.

4.15 Transport

- Consignment documentation covering transport of the waste package [3, 4].

4.16 International Safeguards [5]

- Safeguards category (Safeguarded, Non-safeguarded or Exempt).
- Material Balance Area (MBA) code of facility hosting waste.
- Waste item identifier.
- Batch code.
- Key Measurement Point (KMP) code of installation.
- Measurement basis.
- Element category (Pu, HEU, LEU, NatU, DU or Th).
- Material form code.
- Material container code.
- Material state code.
- Element weight.
- Fissile isotope code (U235, U233 or U235 + U233)
- Fissile isotope weight.
- Obligation code.
- Date and time of all movements of the item and relevant MBAs.

4.17 Hazardous Wastes (if applicable) [6]

- Consignment documentation.

5 REFERENCES

- 1 Nirex, *Generic Waste Package Specification*, Nirex Report N/104 Issue 2, 2007.
- 2 International Atomic Energy Agency, *Regulations for the Safe Transport of Radioactive Material, 1996 Edition (As Amended 2003)*, IAEA Safety Standards Series No. TS-R-1, 2003.
- 3 HM Government, *The Radioactive Material (Road Transport) (Great Britain) Regulations 1996*, SI 1996 No. 1350.
- 4 HM Government, *The Packaging, Labelling and Carriage of Radioactive Material by Rail Regulations 1996*, SI 1996 No. 2090.
- 5 European Commission, *Commission Regulation (Euratom) No. 302/2005 of 8 February 2005 on the Application of Euratom Safeguards*.
- 6 Statutory Instrument 2005 No. 894, *The Hazardous Waste (England and Wales) Regulations, 2005*.

