

Waste Services Contract



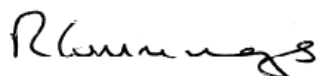
Waste Acceptance Criteria – Low Level Waste Disposal

WSC-WAC-LOW – Version 2.0 – January 2011



Waste Acceptance Criteria – Low Level Waste Disposal

Document Control

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Executive Summary

This document forms part of the Waste Services Contract between LLW Repository Ltd and its Customers. It provides the Waste Acceptance Criteria for low level waste being consigned to LLW Repository Ltd for disposal at the Low Level Waste Repository including details of the physical, chemical, radiological, packaging and transportation requirements that waste must comply with to be accepted.

Along with the criteria for other waste services that make up the Waste Acceptance Criteria, this document details **what** waste can be consigned to LLW Repository Ltd for treatment and / or disposal. It should be read in conjunction with the Waste Acceptance Procedure, including the associated Processes, Guides and Forms, that detail **how** to consign waste to LLW Repository Ltd for treatment and /or disposal. A Process Overview Diagram (Reference: WSC-PRO-OVR) that provides a visual guide to the waste acceptance processes, and all other documents associated with LLW Repository Ltd's Waste Services, are available from our website: www.llwrsite.com

If you need any assistance or have any questions regarding this Waste Acceptance Criteria or LLW Repository Ltd's Waste Services, please contact the LLW Repository Ltd Customer Team by telephone: (01946) 722000 or by e-mail: customerteam@llwrsite.com

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1 Introduction

This document defines the *Waste Acceptance Criteria* for the disposal of low level radioactive waste by *LLW Repository Ltd* at the *Low Level Waste Repository*. This disposal service is available for waste that is not suitable for treatment or not selected for treatment and for secondary waste produced as a result of a treatment service.

1.1 Scope

This Waste Acceptance Criteria (WAC) document represents the full requirements for the Packaging, Receipt, Grouting and Disposal of *Low Level Waste* at the Low Level Waste Repository. The criteria apply to each consignment of waste to LLW Repository Ltd.

1.2 Service Supplier

The Low Level Waste Disposal Service is provided by LLW Repository Ltd at the Low Level Waste Repository in West Cumbria.

1.3 Process

Customers deliver low level waste consignments to the Low Level Waste Repository for disposal. Following receipt, the waste is grouted and disposed of by LLW Repository Ltd.

1.4 Waste Acceptance

For a *Waste Consignment* to be accepted by LLW Repository Ltd, it must satisfy the criteria detailed in this document and the Waste Acceptance Criteria Overview document (Reference: WSC-WAC-OVR). Waste will only be accepted from Customers in accordance with LLW Repository Ltd's Waste Acceptance Procedure. In addition, waste is accepted for disposal at the Low Level Waste Repository based on the availability of sufficient volumetric and radiological capacity.

1.5 Variations

Variations to or waiver of the criteria defined in this document may be allowed but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd. In all cases, approval is required prior to waste being prepared for consignment.

1.6 Approval in Advance

Certain criteria defined in this document state that it is necessary to obtain an Approval in Advance from LLW Repository Ltd. This can be achieved by approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

1.7 Non-Compliant Waste

Any non-compliant wastes consigned to LLW Repository Ltd may require collection by the Customer in accordance with the relevant conditions in the Waste Services Contract.

1.8 Defined Terms

Defined terms within this document are highlighted in *italics* and their meanings are presented in the Glossary.

2 Waste Acceptance Criteria

This section details the Waste Acceptance Criteria for LLW Repository Ltd's Low Level Waste Disposal Service. It is presented in three sections:

- L1 – Physical and Chemical Properties
- L2 – Radiological Properties
- L3 – Packaging and Transport Requirements

L1 Physical and Chemical Properties

L1.1 Waste Treatment and Segregation

Waste should not be consigned for disposal if reasonably practicable measures could be adopted to segregate its constituent parts such that alternative waste treatment and / or disposal services could be used to reduce the final volume requiring disposal at the Low Level Waste Repository or to avoid disposal at the Low Level Waste Repository.

Waste consigned for disposal shall be either secondary waste resulting from a volume reduction or decontamination treatment process or be regarded as waste that is not suitable for treatment and / or waste that is not selected for treatment. Where waste is not selected for treatment, acceptance will require *Suitable Supporting Justification* to be provided.

L1.2 Acceptable Waste

Only solid radioactively contaminated or activated waste will be accepted for disposal at the Low Level Waste Repository.

Waste consigned for disposal must be compliant with the Low Level Waste Repository's Environmental Permit issued under the Environmental Permitting (England and Wales) Regulations 2010 by the Environment Agency (Reference: EPR/YP3293SA). Compliance with the *Disposal Authorisation* can be achieved by complying with the requirements of this Waste Acceptance Criteria and consigning waste in accordance with the Waste Acceptance Procedure.

L1.3 Waste Preparation

Waste must have been treated or packaged in such a way as to render it, so far as is reasonably practicable, insoluble in water and not readily flammable.

L1.4 Non-Waste Materials

Where materials must be added to the waste, the Customer shall use reasonable means to limit the quantity of non-waste materials present in a *Waste Consignment*. It is not acceptable to purposely dilute waste or add shielding materials for the sole purpose of achieving compliance with the requirements of this Waste Acceptance Criteria.

L1.5 Reactive Metals and Materials

Waste shall not contain *Reactive Metals* and other materials which readily react either with water or air with the evolution of heat or flammable gases.

Customers shall use reasonable means to limit the accessible surface area of aluminium, zinc and magnesium within the waste and in any case, the total accessible surface area of

these metals within a *Waste Consignment* must not exceed 10m². Painting or wrapping aluminium, zinc and magnesium wastes are acceptable methods to limit the accessible surface area.

L1.6 Explosive Materials

Waste shall not contain explosive materials.

L1.7 Liquids

Waste shall not contain any *Free Liquid* or liquids with flashpoint less than 21 °C absorbed on solid materials.

Any aqueous and / or non-aqueous liquid waste may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd. In addition, the following conditions must be met:

- Any liquid shall, prior to consignment, be fixed in a *Suitable Solid Matrix* which will not result in release of liquid under applied loads of up to 400kN/m²
- The non-aqueous content of any liquid in the waste shall be conditioned, prior to consignment, so that no visible oil or grease will be released by leaching of the disposed waste form as demonstrated by the *Leaching Test*

L1.8 Soluble Solids

Any discreet *Bulk Chemical Compound* solid wastes (>1kg mass) which are described as soluble or slightly soluble in cold water (inorganic compounds) and water (organic compounds) in the solubility column of the latest edition of the CRC Handbook of Chemistry and Physics may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd. In addition, the following conditions must be met:

- Any soluble or slightly soluble bulk solid waste shall be fixed, prior to consignment, in a *Suitable Solid Matrix* which will not readily release that component as demonstrated by the *Leaching Test*

L1.9 Strong Oxidising Agents

Waste shall not contain strong oxidising agents.

L1.10 Pressurised Gas Receptacles and Aerosols

Waste shall not contain pressurised gas receptacles and aerosols, as defined within The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (or as amended), unless treated, prepared or made safe by a method approved in advance by LLW Repository Ltd.

L1.11 Toxic Materials

Waste shall not contain materials which generate or are capable of generating toxic gases, vapours or fumes harmful to persons handling the waste.

L1.12 Chemical Complexing or Chelating Agents

Waste shall not contain chemical complexing or chelating agents.

L1.13 Ion Exchange Materials

Waste shall not contain *Ion Exchange Material* unless conditioned using a method approved in advance by LLW Repository Ltd. This is likely to involve the *Ion Exchange Material* being fixed, prior to consignment, in a *Suitable Solid Matrix* which meets the leachable component requirements as demonstrated by the *Leaching Test*.

L1.14 Biological, Infectious and Pathogenic Materials

Waste shall not contain biological, pathogenic or infectious materials, as listed within Hazard Groups 2, 3 or 4 in the Approved List of biological agents produced by The Advisory Committee on Dangerous Pathogens, unless treated so that no viable micro-organism(s) from Hazard Groups 2, 3 or 4 exist by a method approved in advance by LLW Repository Ltd.

L1.15 Putrescible Waste

Customers shall use reasonable means to limit the quantity of *Putrescible Materials* in the waste and in any case, the total weight within a *Waste Consignment* must not exceed 1% of the total weight of waste.

L1.16 Hazardous Waste

The Hazardous Waste (England and Wales) Regulations 2005 (or as amended) apply to a limited amount of radioactive waste as most radioactive waste is subject to the provisions of the Radioactive Substances Act 1993 and is therefore outside the scope of the Hazardous Waste Regulations. However, to fulfil regulatory expectations in relation to disposals at the Low Level Waste Repository, waste containing hazardous waste must be controlled. It may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd. The Form must include details of the components that make the waste hazardous and the levels at which they are present.

Materials that are likely to, or actually, possess one or more *Hazard Properties* shall be assessed and where present be excluded from the waste or made safe prior to any conditioning or mixing with other materials. Customers should use process knowledge to demonstrate that materials do not contain the components listed in Table 1 before resorting to material testing. For the material to be made safe, the hazards or risks shall be removed or reduced, by a method approved in advance by LLW Repository Ltd, to such a level that a *Waste Consignment* no longer possesses that hazard or risk.

It is recognised that not all types of Hazardous Waste are relevant to disposals at the Low Level Waste Repository. Customers are therefore encouraged to consult with LLW Repository Ltd prior to the preparation of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV).

A Waste Consignment Variation Form (Reference: WSC-FOR-WCV) is not required for waste containing the hazardous components listed in Table 1 where the concentrations are below the stated Inert Waste leaching limit values.

Table 1: Leaching Limit Values for Inert Waste and Stable Non-Reactive Waste

Component	Symbol	Leaching Limit Value (mg/kg dry substance)	
		<i>Inert Waste</i>	<i>Stable Non-Reactive Waste</i>
Arsenic	As	0.5	2
Barium	Ba	20	100
Cadmium	Cd	0.04	1
Total Chromium	Cr total	0.5	10
Copper	Cu	2	50
Mercury	Hg	0.01	0.2
Molybdenum	Mo	0.5	10
Nickel	Ni	0.4	10
Lead	Pb	0.5	10
Antimony	Sb	0.06	0.7
Selenium	Se	0.1	0.5
Zinc	Zn	4	50
Chloride	C ⁻	800	15,000
Fluoride	F ⁻	10	500
Sulphate	SO ₄ ²⁻	1,000	20,000
Dissolved Organic Carbon	DOC	500	800

The Leaching Limit Value should be determined using the standard defined in: BS EN 12457-3: 2002, Characterisation of waste, Leaching Compliance test for leaching of granular waste materials and sludges, Part 3: Two stage batch test at a liquid to solid ratio of 2 l/kg and 8 l/kg for materials with a high solid content and with a particle size below 4 mm (without or with size reduction).

If any Inert Waste leaching limit values in Table 1 are exceeded, a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) is required for waste containing the hazardous components provided the concentrations are below the stated Stable Non-Reactive leaching limit value listed in Table 1.

If both sets of leaching limit values in Table 1 are exceeded, a sample of the waste must be fixed in a *Suitable Solid Matrix* and the new leaching limit value of the monolithic waste form should be determined using the standard defined in EA NEN 7375:2004, Leaching Characteristics of Moulded or Monolithic Building and Waste Materials, Determination of Leaching of Inorganic Components with the Diffusion Test, 'The Tank Test', Version 1.0, April 2005 published by the Environment Agency.

Following this test, if all concentrations are below the Hazardous Waste leaching limit values listed in Table 2, waste may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd. In addition, the hazardous waste shall be fixed, prior to consignment, in a *Suitable Solid Matrix*.

Table 2: Leaching Limit Values for Hazardous Waste

Component	Symbol	Leaching Limit Value (mg/kg dry substance)
Arsenic	As	0.5
Barium	Ba	20
Cadmium	Cd	0.04
Total Chromium	Cr total	0.5
Copper	Cu	2
Mercury	Hg	0.01
Molybdenum	Mo	0.5
Nickel	Ni	0.4
Lead	Pb	0.5
Antimony	Sb	0.06
Selenium	Se	0.1
Zinc	Zn	4
Chloride	C ⁻	800
Fluoride	F ⁻	10
Sulphate	SO ₄ ²⁻	1,000
Dissolved Organic Carbon	DOC	500

If the concentrations exceed the leaching limit values in Table 2, the hazardous waste is unlikely to be acceptable for disposal at the Low Level Waste Repository. Further advice should be sought from LLW Repository Ltd.

Conditioning processes may be used to ensure hazardous waste is below the Leaching Limit Value must but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

The quantity of all hazardous waste in a *Waste Consignment* must be recorded in the relevant section of the Waste Consignment Information Form (Reference: WSC-FOR-WCI).

L1.16.1 Lead

Waste containing lead may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd. The form submission must include the following information:

- Surface area of lead, in m², including both readily accessible surface areas and inaccessible areas, such as Lead encased in steel or cement.
- Total volume of lead, in m³

The quantity of all lead in a *Waste Consignment* must be recorded in the relevant section of the Waste Consignment Information Form (Reference: WSC-FOR-WCI).

L1.16.2 Asbestos

Waste containing asbestos may be consigned for disposal in accordance with the following requirements:

- Where the asbestos to be disposed of is *Supercompactable Waste* that has not undergone high force compaction, the volume of asbestos in a *Waste Consignment*

shall be considered as *Inaccessible Voidage* and is therefore restricted to the limits specified in L3.4

- Where the asbestos to be disposed of is not *Supercompactable Waste* or is *Secondary Waste* that has undergone high force compaction, the volume of asbestos in a *Waste Consignment* is not restricted
- All asbestos consigned for disposal must be double-bagged or double-wrapped in a suitable plastic material and securely tied or sealed. Air should be excluded from the bag or wrapping as far as possible before sealing. In addition, all asbestos wastes must be restrained within the *Waste Consignment* to prevent floatation of the waste during the grouting process at the Low Level Waste Repository.

The quantity of all asbestos in a *Waste Consignment* must be recorded in the relevant section of the Waste Consignment Information Form (Reference: WSC-FOR-WCI).

L1.17 Hazardous Substances and Non-Hazardous Pollutants

The Groundwater (England and Wales) Regulations 2009 (or as amended) apply to disposals at the Low Level Waste Repository. The disposals of *Hazardous Substances* and *Non-Hazardous Pollutants* must therefore be controlled. Waste containing *Hazardous Substances* and *Non-Hazardous Pollutants* may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd.

L2 Radiological Properties

L2.1 Radioactive Contaminant

The waste within a *Waste Consignment* for disposal at the Low Level Waste Repository must consist of waste deemed to be contaminated and not the primary contaminant itself. The weight of the *Radioactive Contaminant* should not exceed 10% of the weight of the *Waste Consignment*. This limit may be exceeded but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd.

L2.2 Radioactivity Limits

The *Activity* of any *Waste Consignment* consigned for disposal as low level waste at the Low Level Waste Repository shall not exceed the following values:

- 4GBq/t for all alpha-emitting radionuclides
- 12GBq/t for all other radionuclides

In accounting for *Activity* against these limits, the activity of *Decay Products* with half-lives of less than three months shall not be accounted for unless they are not in equilibrium or if they form a major proportion of the total *Activity*.

L2.3 Fissile Radionuclides

Waste containing *Fissile Radionuclides* may be consigned for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

A Waste Consignment Variation Form (Reference: WSC-FOR-WCV) is not required for waste that meets the relevant requirements stated in L2.3.1 to L2.3.5.

There are no exceptions for waste containing Cm-247. A Waste Consignment Variation Form (Reference: WSC-FOR-WCV) is required for all *Waste Consignments* containing Cm-247.

L2.3.1 Uranium

Waste containing U-235 may be consigned provided that the *Waste Consignment* meets the following requirements:

- All the uranium present is either natural or depleted uranium, or
- The U-235 content of any *Waste Consignment* does not exceed 60g

L2.3.2 Plutonium

Waste containing plutonium may be consigned provided that the *Waste Consignment* meets the following requirements:

- Total Pu alpha (i.e. Pu-238 + Pu-239 + Pu-240 + Pu-242) does not exceed 0.1GBq/t
- Pu-241 complies with the Radioactivity Limits defined in L2.2.

Waste containing plutonium above these limits may be permitted, subject to safety assessment, but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

L2.3.3 Neptunium

Waste containing Np-237 may be consigned provided that the *Waste Consignment* does not contain more than 4GBq/t of Np-237.

L2.3.4 Americium

Waste containing Am-241, Am-242m and / or Am-243 may be consigned provided that the *Waste Consignment* does not contain more than 0.1GBq/t of each of these radionuclides.

L2.3.5 Other Fissile Radionuclides

Waste containing the *Fissile Radionuclides* listed in Table 3 may be consigned provided that the *Waste Consignment* does not contain more than the stated fissile limit, in MBq/t.

Table 3: Fissile Radionuclide Limits

Radionuclide	Fissile Limit (MBq/t)
Th-228	100
U-232*	1
U-233*	1
U-234*	0.01
U-236*	0.0001
Pa-231	0.1
Pa-232	100
Cm-243	100
Cm-244	100
Cm-245	1
Cm-246	1
Cf-249	1
Cf-250	10
Cf-251	1
Cf-252	1
Es-254	10

Notes:

* Control of these *Fissile Radionuclides* is only required where artificial means have been employed to enrich the uranium specifically in these radionuclides. Products of U-235 enrichment processes are covered by L2.3.1.

L2.4 Radiation

The maximum radiation level at any point on the external surface of the *Disposal Container* shall not exceed 2mSv/h.

L2.5 Contamination

External non-fixed contamination levels on the *Disposal Container* at the time of consignment shall be as low as reasonably practicable and in any case not more than 0.4Bq/cm² for all alpha-emitting radionuclides and 4Bq/cm² for all other radionuclides averaged over an area of 300cm².

L2.6 Sealed Sources

Closed sources, including sealed sources, laminated sources and/or homogeneous sources, as defined in The Radioactive Substances (Waste Closed Sources) Exemption Order 1963 (or as amended), may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd. Customers must have tried to return sources to the supplier or manufacturer and considered alternative uses before consigning sources for disposal. In addition, the following conditions must be met:

- Each individual source to be disposed of must not, in its raw state, exceed 1MBq total Alpha and Non Alpha activity
- As much extraneous packaging and shielding must be removed from the source as possible
- Sources are to be grouted into a *Small Container* and have approximately 100ml of grout surrounding each source.
- The maximum number of sources to be disposed of in a *Small Container* is 150, if the 15 litre maximum size container is used.
- Only one *Small Container* may be consigned within a *Waste Consignment*
- For the purpose of calculating the specific activity of the Waste Consignment, the weight of the grout and Small Container may be included to give the specific activity of the sources, in GBq/t
- A unique Waste Characterisation Form (Reference: WSC-FOR-WCH) must be approved by LLW Repository Ltd for each *Small Container* disposal and include the following information: source registration references, the radionuclides, the total activity per source, any radioactive decay calculations, the number of discreet sources and the amount of grout per source in the *Small Container*

L3 Packaging and Transport Requirements

L3.1 Approved Disposal Containers

Waste for disposal may be consigned to the Low Level Waste Repository in any of the approved *Disposal Containers* listed in Table 4.

Table 4: Approved Disposal Containers

Disposal Container Type	Design Ref.	Historic Ref.	Column A (tonne)	Column B (tonne)	Column C (m ³)	Column D (m ³)
1/3 Height Disposal Container	TC03	2989	35	40	11.3	13.0
1/2 Height Disposal Container	TC09	2910B	35	42	17.9	19.5
1/2 Height Disposal Container	TC01	2910C	35	42	17.9	19.5
2/3 Height Disposal Container	TC06	2968	40	42	22.3	26.8
3/4 Height Disposal Container	TC04	3550	35	42	24.8	29.7
1/3 Height Fissile Disposal Container	N/A	3563	35	40	11.3	13.0
1/2 Height Fissile Disposal Container	N/A	3564	35	42	17.9	19.5
WAMAC Disposal Container	TC07	2947B	35	40	17.9	20.0
WAMAC Disposal Container	TC08	2947C	35	40	17.9	20.0
ISO Skip Disposal Container	N/A	2921B	17	22	8.5	11.4

Notes:

Column A: shows the maximum gross weight, in tonnes, for compliance with the Certificate of Approval for each container design. The maximum gross weight for any individual container is recorded in the Container Safety Convention (CSC) approval plate on each container and shall be checked before the container is filled with waste.

Column B: shows the maximum gross weight of the container, in tonnes, after in-fill grouting that can be routinely handled at the Low Level Waste Repository. Disposal Containers exceeding this value prior to being completely filled with grout will be classed as *Overweight Containers* in accordance with L3.6.

Column C: shows the *Internal Volume* of each Disposal Container type, in m³, which is used for the purposes of calculating the maximum *Inaccessible Voidage* that may be accepted in a Disposal Container in accordance with L3.4.

Column D: shows the *Package Volume* of each Disposal Container type, in m³, which is used for the purposes of calculating the disposal charges, independent of the actual volume of waste in the container.

L3.2 Other Containers

Waste that cannot be readily consigned in one of the approved *Disposal Containers*, as detailed in L3.1, may be acceptable for disposal in other containers but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) and *Suitable Supporting Justification* by LLW Repository Ltd.

L3.3 Non-Containerised Waste

Non-containerised waste is not accepted for disposal at the Low Level Waste Repository.

L3.4 Inaccessible Voidage

Customers are responsible for loading the *Disposal Container* so that *Inaccessible Voidage* is minimised as far as reasonably practicable and in any event shall not exceed 10% of the *Internal Volume* of the *Disposal Container*, as defined in Column C of Table 4.

As far as reasonably practicable, any *Inaccessible Voidage* shall be uniformly distributed within the *Disposal Container*.

L3.5 Packing Efficiency

Customers are responsible for loading the *Disposal Container* so that, as far as reasonably practicable, waste is packaged in such a way as to maximise the *Packing Efficiency* of the *Disposal Container*, whilst ensuring sufficient grout penetration can still be attained.

L3.6 Overweight Containers

Customers are responsible for loading the *Disposal Container* so that when it is filled with grout, of nominal density 1,800 kg/m³, the gross weight of the *Disposal Container* does not exceed the maximum gross weight in Column B of Table 4. Where Customers calculate or anticipate that the *Disposal Container* will exceed the maximum gross weight after grouting, the *Waste Consignment* may still be accepted but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

L3.7 Disposal Container Venting

The *Disposal Container* shall not be left un-vented for more than thirty days in advance of delivery to the Low Level Waste Repository.

L3.8 Disposal Container Labelling

Each *Disposal Container* shall be uniquely marked or labelled so as to be legible for at least five years after delivery such that the Customer and a Consignment Serial Number can be identified.

L3.9 Photographic Records

Customers are responsible for ensuring that, as far as reasonably practicable, photographic records of the step by step filling of the *Disposal Container* with waste are produced and retained by the Customer. Photographs should be taken when the *Waste Consignment* is approximately 25% full, 50% full, 75% full and 100% full. File references for the photographs must be recorded in the relevant section of the Waste Consignment Information Form (Reference: WSC-FOR-WCI).

Photographic records are not required for WAMAC Disposal Containers.

L3.10 Transport Regulations

Waste must be consigned for treatment or disposal in accordance with the latest edition of IAEA TS-R-1 (Safe Transport of Radioactive Material Regulations), as required by The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (or as amended) and ADR, under one of the following classifications:

- Excepted Package
- Low Specific Activity material (LSA I, LSA II)
- LSA III (subject to confirmation of leaching test)
- Surface Contaminated Object (SCO I or SCO II)

Customers are responsible for ensuring compliance with the transport regulations and the Certificate of Approval for the specific Container Design including the requirements of any associated Packing and Handling Instructions.

In addition, any *Waste Consignment* or *Disposal Container* that does not, in its own right, comply with the requirements of the current transport regulations and requires additional shielding or an overpack to achieve compliance, may be accepted for disposal but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

L3.11 Transport of Fissile Radionuclides

Waste transported in IP-2 containers may contain very low quantities or very low concentrations of *Fissile Radionuclides* when classified as Fissile Excepted Packages. In order to use the Fissile Excepted Package classification, one of the fissile exemption criteria in the Transport Regulations must be satisfied and the justification documented.

Please note that the fissile excepted criteria do not always align with the criteria for *Fissile Radionuclides* in L2.3.

Customers must contact LLW Repository Ltd for advice if they intend to consign waste to LLW Repository Ltd that contains *Fissile Radionuclides* above the fissile excepted criteria, prior to loading waste.

Customers must ensure they fulfil the requirements of these Waste Acceptance Criteria and the Transport Regulations when consigning *Fissile Radionuclides* to LLW Repository Ltd.

L3.12 Part Loads

A *Waste Consignment* may not be consigned to LLW Repository Ltd if sent as a part-load with other materials that are not *Low Level Waste* on the same vehicle.

L3.13 Site Rules and Instructions

When delivering waste to LLW Repository Ltd for disposal, the Customer's representatives must observe the site rules and instructions at the Low Level Waste Repository or the *Service Supplier's* site.

3 Glossary

Activity, expressed in Becquerels, means the number of spontaneous nuclear transformations occurring in a period of one second.

Bulk Chemical Compound means discreet (>1kg mass) specific purposeful accumulations in one space of (typically) manufactured salts of elemental combinations, usually having anionic and cationic components.

Complexing Agents means either chelating agents or monodentate organic ligands.

Consign, in the context of waste, means to transfer waste to LLW Repository Ltd for the purpose of disposal at the Low Level Waste Repository and **Consigned** has a corresponding meaning.

Decay Products means those radionuclides succeeding another radionuclide in the radioactive decay chain in which both, or all, occur.

Disposal Container(s) means those containers, as defined in L3.1, that are approved for use to *Consign a Waste Consignment* to the Low Level Waste Repository for disposal.

Environmental Permit means the Environmental Permit for the Low Level Waste Repository (Reference: EPR/YP3293SA) issued under the Environmental Permitting (England and Wales) Regulations 2010 by the Environment Agency.

Fissile Radionuclides means any of the following radionuclides:

Th-228	Np-237	Pa-231	Cm-243	Cf-249
U-232	Pu-238	Pa-232	Cm-244	Cf-250
U-233	Pu-239	Am-241	Cm-245	Cf-251
U-234	Pu-240	Am-242m	Cm-246	Cf-252
U-235	Pu-241	Am-243	Cm-247	Es-254
U-236	Pu-242			

Free Liquid means any liquid which is present as a separate phase including liquid which is physically absorbed onto a solid matrix rather than chemically combined.

Hazard Properties means the following properties of waste, which render them hazardous in accordance with the Hazardous Waste (England and Wales) Regulations 2005:

- H1 “Explosive”: substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.
- H2 “Oxidising”: substances and preparations, which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances.
- H3-A “Highly Flammable”:
 - liquid substances and preparations having a flash point below 21°C (including extremely flammable liquids), or
 - substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or

- solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the ignition source, or
 - gaseous substance and preparations which are flammable in air at normal temperature and pressure, or
 - substances and preparations, which in contact with water or damp air evolve highly flammable gases in dangerous quantities.
- H3-B “Flammable”: liquid substances and preparations having a flash point equal to or greater than 21°C and less than or equal to 55°C.
- H4 “Irritant”: non-corrosive substances and preparations, which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation.
- H5 “Harmful”: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
- H6 “Toxic”: substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.
- H7 “Carcinogenic”: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence.
- H8 “Corrosive”: substances and preparations, which may destroy living tissue on contact.
- H9 “Infectious”: substances containing viable microorganisms or their toxins, which are known or reliably believed to cause disease in man or other living organisms.
- H10 “Teratogenic”: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence.
- H11 “Mutagenic”: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence.
- H12 Substances and preparations, which release toxic or very toxic gases in contact with water, air or an acid.
- H13 Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any characteristics listed above.
- H14 “Ecotoxic”: substances and preparations, which present or may present immediate or delayed risks for one or more sectors of the environment.

Hazardous Substance(s) means any substance or group of substances that are toxic, persistent and liable to bioaccumulate. This includes the following when they are toxic, persistent and liable to bio-accumulate:

- organohalogen compounds and substances which may form such compounds in the aquatic environment
- organophosphorous compounds
- organotin compounds
- substances and preparations, or the breakdown products of such, which have been proved to possess carcinogenic or mutagenic properties or properties which may affect

steroidogenic, thyroid, reproduction or other endocrine-related functions in or via the aquatic environment

- persistent hydrocarbons and persistent and bioaccumulable organic toxic substances
- cyanides
- metals (in particular cadmium and mercury) and their compounds
- arsenic and its compounds
- biocides and plant protection products

Inaccessible Voidage means the voidage within a *Disposal Container*, including within the waste, which will not be readily penetrated by grout during the conditioning process prior to disposal at the Low Level Waste Repository.

Internal Volume means the accessible space, in m³, within a *Disposal Container*, used for the purposes of calculating the maximum allowable *Inaccessible Voidage* and the *Packing Efficiency* after grouting at the Low Level Waste Repository.

Ion Exchange Material means any material, whether synthetic or naturally occurring, that has the capability of interchanging ions from one substance to another by means of a reversible chemical or physical process.

Leaching Test means the test used to demonstrate a *Suitable Solid Matrix* for the encapsulation of lower activity liquors, lower activity non-aqueous liquors containing oils, soluble solids, or other waste forms requiring encapsulation. To meet the requirements of this *Waste Acceptance Criteria*, the following leaching test should be used:

- Cast homogeneous samples of the encapsulated matrix, produced using representative non-active liquors or soluble solids at the maximum proposed oil or solid loading where required. Cylindrical samples of 5 cm in height and 5 cm in diameter are suggested as being an appropriate size.
- After a minimum of 48 hours curing, the cylindrical samples should be placed individually in vessels containing a known volume of de-mineralised water, with the water volume relating to the sample surface area at a ratio of 200ml to 10cm² (i.e. the cylindrical sample size defined above will require approximately 2.4 litres of water). The samples should then be submerged so that all surfaces are in contact with water and the sample is supported above the bottom of the vessel. The water vessel should then be covered and left sitting at room temperature for 7 days.
- After 7 days:
 - For oil bearing liquors:*
The surface of the water should be checked for any visible oil or grease, and a measurement made of the oil content within the water, in parts per million, after thorough mixing.
 - For other waste forms:*
A measurement of the leachable component in the water should be made, in parts per million, using Atomic Absorption or Ion Chromatography.
- The sampled water should be returned to the vessel containing the matrix sample and the vessel covered and left at room temperature for a further 21 days. An additional check for oil or grease on the water surface should be made after the second test period and the oil content or leachable component within the water again measured after thorough mixing.

- The results obtained should then be made available to LLW Repository Ltd for assessment as part of the Waste Consignment Variation Form (Reference: WSC-FOR-WCV). The acceptance criteria are generally:

For oil bearing liquors:

Less than 15 parts per million of oil in the leachate water after 28 days immersion.

For other waste forms:

Leachable components are assessed on a case by case basis by taking into account the current disposal inventory, leachate modelling data and limits placed on leachate parameters in the Low Level Waste Repository's *Disposal Authorisation*.

- Additional samples should be made and sealed during the initial casting process and retained for possible use by LLW Repository Ltd for confirmation testing.
- Alternative testing methods or a relaxation of the test requirements may under certain conditions be permissible but only on approval of a Waste Consignment Variation Form (Reference: WSC-FOR-WCV) by LLW Repository Ltd.

LLW Repository Ltd means the waste management company that holds the Site Licence to manage and operate the Low Level Waste Repository under contract to the owner of the site, the Nuclear Decommissioning Authority.

Low Level Waste means solid low level radioactive waste in accordance with the requirements specified in this Waste Acceptance Criteria document. It typically includes metals, soil, building rubble and organic materials, which arise principally as lightly contaminated miscellaneous scrap. Metals are mostly in the form of redundant equipment. Organic materials are mainly in the form of paper towels, clothing and laboratory equipment that have been used in areas where radioactive materials are used, such as hospitals, research establishments and the nuclear industry. Low Level Waste contains radioactive materials other than those acceptable for disposal with municipal and general commercial or industrial waste.

Low Level Waste Repository means the national low level radioactive waste disposal facility situated near the village of Drigg in West Cumbria.

Non-Hazardous Pollutant means any substance liable to cause pollution other than a *Hazardous Substance*.

Overweight Container(s) means any *Disposal Container* that, prior to being completely filled with grout at the Low Level Waste Repository, exceeds the maximum gross weight limit, in tonnes, that can be routinely handled. These containers require additional processing to make them suitable for disposal at the Low Level Waste Repository.

Package Volume means the volume represented by the maximum external dimensions of a disposal container. This is the cubic volume calculated from the maximum length, width and height. This is the volume that the container will occupy within the disposal facilities at the Low Level Waste Repository. It is used to calculate the volume charge for the Low Level Waste Disposal Service.

Packing Efficiency means the extent to which the *Internal Volume* in a *Disposal Container* is fully utilised. It is a ratio of the volume of waste to the accessible volume of the container expressed as a percentage. The packing efficiency is calculated based on the amount of grout required to fill the container at the Low Level Waste Repository.

Putrescible Materials means materials liable to be readily decomposed by micro-organisms, excluding wood and paper.

Radioactive Contaminant means the proportion of the radionuclides in the waste that give rise to it being radioactive. The proportion of radioactive contaminant in the waste is based on the weight of the radionuclide causing the radioactivity. For most *Low Level Waste* it would be expected that the weight of the radionuclides compared to the weight of the contaminated materials would be very small and certainly less than 10%. For this limit to be excessively exceeded would imply that the radionuclide itself is a significant proportion of the waste, rather than materials contaminated by it. Examples of this are radioactive ores, process streams, and purified product, e.g. depleted uranium.

Reactive Metals means those elements located in Group IA, first column, of the periodic table, (alkali metals) and those elements located in Group IIA, second column, of the periodic table (alkaline earth metals).

Reassertion means the increase in volume of a supercompacted drum or box within a period of thirty minutes after release of the high force compaction pressure and containment following *Supercompaction*.

Secondary Waste means waste for disposal at the Low Level Waste Repository that arises from a treatment process completed by LLW Repository Ltd for a Customer under the Waste Services Contract.

Small Container means a container used for the disposal of sealed sources in accordance with L2.6, such as a redundant paint tin. Sources should be packaged together in the smallest container required and fixed in that container by the addition of grout. A minimum container size of 1 litre is recommended. The maximum container size is 15 litres.

Soluble Solids means any solid chemical compound that is indicated as having a soluble or slightly soluble property in water in the latest edition of the CRC "Handbook of Chemistry and Physics"

Suitable Solid Matrix means the output of a conditioning process, approved by LLW Repository Ltd, to fix liquids or soluble solids in a form suitable for disposal. Typically, this will involve encapsulation of material in a cement based grout, though other alternative solutions may be acceptable following approval by LLW Repository Ltd.

Suitable Supporting Justification means additional information that may be required to support an application to consign waste to LLW Repository Ltd or to seek a variation to the Waste Acceptance Criteria. The form of justification required will be dependent upon the nature of the issue to be considered. In some cases, the justification will be in the form of a Best Practicable Means (BPM) Assessment, a Best Practicable Environmental Option (BPEO) Assessment or a Best Available Technique (BAT) Assessment. Advice on the level of justification required should be sought from LLW Repository Ltd.

Supercompactable Waste means those wastes for which the best available technique for management is to render them into a form suitable for High Force Compaction and which if subject to High Force Compaction and allowing for *Reassertion* could reasonably be expected to be reduced in volume by 30% or more. *Supercompactable Waste* can typically consist of: paper, gloves, tape, sisalkraft, cloth, punctured and drained aerosol cans, small tool items (hammer

heads, bolts, nuts etc) in small quantities, light gauge metal assemblies, small quantities of timber, plastic items, PPE, small quantities of glass (wrapped in tape and placed in a tin with the lid taped), electrical cables, electrical conduit, size reduced chairs and wastes of similar size and composition.

Supercompaction means the application of pressure of at least 20,000kN/m². *Supercompacted* has a corresponding meaning.

Waste Acceptance Criteria means the requirements set out in this document and the Waste Acceptance Criteria Overview (Reference: WSC-WAC-OVR) and relevant Statutory Regulations applicable to the customer in respect of the transport, treatment and disposal of *Low Level Waste*.

Waste Consignment means one *Disposal Container* and its contents of waste and packaging with a maximum external volume of 40m³, received from a single Customer on one road or rail vehicle as specified in the Waste Consignment Information Form (Reference: WSC-FOR-WCI).