

Waste Acceptance Criteria

Low Level Waste Disposal

WSA-WAC-LOW – Version 1.0



Waste Acceptance Criteria – Low Level Waste Disposal

Document Control

	Name	Signature	Date
Prepared by:	[Name] [Job Title]		[DD/MMM/YYYY]
Checked by:	[Name] [Job Title]		[DD/MMM/YYYY]
Approved by:	[Name] [Job Title]		[DD/MMM/YYYY]



Contents

Introduction.....	4
Scope.....	4
Supplier	4
Variations	4
Waste Acceptance Criteria.....	4
1. Physical Properties.....	4
L-1.1. Admissible materials.....	4
L-1.2. Materials to be excluded or prepared and made safe.....	5
L-1.2.1. Liquids.....	5
L-1.2.2. Soluble solids	5
L-1.2.3. Toxic gas.....	5
L-1.2.4. Ion Exchange Materials and Complexing Agents.....	5
L-1.2.5. Infectious and pathogenic materials.....	5
L-1.3. Articles To Be Excluded.....	6
L-1.3.1. Pressurised gas receptacles and aerosols.....	6
L-1.3.2. Large components.....	6
L-1.4. Materials to be restricted	6
L-1.4.1. Reactive metals.....	6
L-1.4.2. Graphite	6
L-1.5. Further non-radiological requirements.....	6
2. Radioactivity Limits.....	6
L-2.1. External non-fixed contamination	6
L-2.2. Activity limits.....	7
L-2.3. Fissile content	7
L-2.3.1. Pu & U-235.....	7
L-2.3.2. Np-237	8
L-2.3.3. Other radionuclides	8
3. Waste Packaging	9
L-3.1. Acceptable Containers.....	9



Introduction

This volume defines the Waste Acceptance Criteria for direct disposal of low level waste at the Low Level Waste Repository.

This service is available for waste that is not suitable for treatment, and for secondary waste produced as a result of a treatment service.

Scope

These Waste Acceptance Criteria (WAC) represent the requirements for Receipt, Grouting and Disposal of radioactive waste at the Low Level Waste Repository.

Supplier

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

Variations

Alterations to these requirements are only permitted via the submission of a Waste Consignment Variation Form.

Waste Acceptance Criteria

Waste consignments for disposal at the Low Level Waste Repository must satisfy the conditions detailed in the Waste Acceptance Criteria Overview, Ref: WSA-WAC-OVR, and this Service Volume.

1. Physical Properties

L-1.1. Admissible materials

The only waste that will be accepted for disposal at the Low Level Waste Repository is solid radioactively contaminated or activated waste compliant with The Low Level Waste Repository Certificate of Authorisation BZ2508.

Best practicable means shall be used to compact solid waste for disposal at the Low Level Waste Repository. Waste for grouting in approved containers shall be either High Force Compacted, secondary waste resulting from volume reduction or decontamination treatment or be regarded as waste that is not suitable for segregation. Unsuitability for segregation or volume reduction treatment shall be underpinned by a BPEO study or similar.

Waste must meet activity, chemical and physical requirements and 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.



L-1.2. Materials to be excluded or prepared and made safe

L-1.2.1. Liquids

- No Free Liquor shall be present in the waste.
- Any aqueous and/or non-aqueous liquid waste shall be fixed in a solid matrix (e.g. cement) 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 treated so that no visible oil or grease will be released by leaching of an Uncompactable Waste form.
- Where this conditioning route is used to render non-aqueous liquids or materials into a form that will be accepted for disposal, the details shall be cleared in advance with LLW Repository Ltd by the Waste Consignment Variation Form route and must include justification.

L-1.2.2. Soluble solids

Any discreet bulk (>1kg) chemical compound solid wastes that are described as soluble or slightly soluble in cold water (inorganic compounds) and water (organic compounds) in the solubility column of the CRC Handbook of Chemistry and Physics (latest edition) are applicable wastes, if the following conditions are met:

- No soluble/slightly soluble bulk solid wastes shall be disposed of in an unconditioned way.
- Any soluble/slightly soluble bulk solid waste shall be fixed in a solid matrix (e.g. cement), which will not readily release that component under test.

Where this conditioning route is used to render solid wastes into a form that will be accepted for disposal, the details shall be cleared in advance with LLW Repository Ltd by the Waste Consignment Variation Form route.

L-1.2.3. Toxic gas

Waste shall not contain, or be capable of generating, any toxic gases, vapours, or fumes harmful to persons, or causing an explosive hazard, during normal operations for grouting.

L-1.2.4. Ion Exchange Materials and Complexing Agents

The following materials shall be excluded unless treated, prepared or stabilised by a method approved in advance by LLW Repository Ltd by the Waste Consignment Variation Form route. Approval of the Environmental Agency will be required for disposal.

- Ion Exchange Materials
- Complexing Agents

L-1.2.5. Infectious and pathogenic materials

Waste containing biological, pathogenic or infectious materials listed within Hazard Groups 2, 3 or 4 produced by The Advisory Committee on Dangerous Pathogens (UK - HSC) shall be excluded from the waste or treated so that there exists no viable micro-organism(s) from Hazard Groups 2, 3 or 4. Any method employed to treat the waste shall be approved in advance by LLW Repository Ltd by the Waste Consignment Variation Form route.



L-1.3. Articles To Be Excluded

The following articles shall be excluded unless treated, prepared or made safe by a method approved in advance by LLW Repository Ltd by the Waste Consignment Variation Form route.

L-1.3.1. Pressurised gas receptacles and aerosols

Pressurised gas receptacles and aerosols as defined within The Carriage of Dangerous Goods (Classification, Packaging and Labelling) and Use of Transportable Pressure Receptacles Regulations 2004 (or as amended)

L-1.3.2. Large components

Large components and non-containerised items are excluded.

L-1.4. Materials to be restricted

L-1.4.1. Reactive metals

Grouting of the waste by LLW Repository Ltd consists of adding a water based alkaline grout. Aluminium, zinc and magnesium can potentially react with the grout but need only be considered if their totalled accessible surface area in a Consignment is greater than 10m². Quantities of such materials in a Consignment with higher surface areas, or of other potentially reactive metals, shall be assessed by the customer on a case-by-case basis and this assessment included in the Wastestream Characterisation Document (WSCD). Further details of grout properties can if necessary be provided by LLW Repository Ltd.

L-1.4.2. Graphite

Any consignment with a bulk graphite content exceeding 5 Te shall be approved in advance by LLW Repository Ltd by the Waste Consignment Variation Form route.

L-1.5. Further non-radiological requirements

Where materials are added to the waste, then the Customer shall use reasonable efforts to limit the quantity of non-waste materials present in a Consignment. In particular, it is not acceptable to purposely dilute waste or add shielding materials for the sole purpose of achieving compliance with this specification.

2. Radioactivity Limits

L-2.1. External non-fixed contamination

External non-fixed contamination levels on Transport Containers and Disposal Containers at the time of dispatch shall be as low as reasonably practicable and in any case not more than 4 Bq/cm² beta/gamma and 0.4 Bq/cm² alpha averaged over an area of 300 cm².



L-2.2. Activity limits

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

GBq/te

- i) All alpha-emitting nuclides 4
- ii) All other radionuclides not included in (i) above 12

In accounting for radioactivity against these Consignment limits, the activity of Short Half-Life decay products with half-lives of less than three months shall not be accounted if they are present in amounts not exceeding those which could be present through decay of accounted nuclides.

L-2.3. Fissile content

Low Level Waste consignments may contain mixed wastes that are lightly surface contaminated with fissile material.

Waste containing isotopes needing criticality control*¹ shall not be Consigned unless Low Level Waste Repository Ltd has been notified in advance and has agreed to the disposal by the Waste Consignment Variation Form route .

The exceptions to this requirement are set out in paragraphs L-2.3.1 & L-2.3.2.

Note: there is no exception for waste containing Cm247; it shall always be subject to prior written notice and agreement by the Waste Consignment Variation Form route.

Characterisation of waste for fissile radionuclides shall seek to establish maximum values of relevant isotopes.

No Low Level Waste waste will be accepted for disposal with a bulk graphite content exceeding 5 Te without seeking further criticality advice.

Specific inventory limits for ISO containers wastes are set for Pu, U and Np237.

L-2.3.1. Pu & U-235

The permitted inventory of a Low Level Waste consignment² is:

¹ * Isotopes requiring criticality control are:

Th228	Np237	Pa231	Cm243	Cf249
U232	Pu238	Pa232	Cm244	Cf250
U233	Pu239	Am241	Cm245	Cf251
U234	Pu240	Am242m	Cm246	Cf252
U235	Pu241	Am243	Cm247	Es254
U236	Pu242			

² A 'LLW consignment' in this context applies to any ISO freight container filled with waste.



- Less than 150g (Pu+U235), or
- Less than 300g U235 if contaminated with low enriched uranium (>1.6 % U235 w.r.t U and <5% U235 w.r.t. U,) and less than 15g Pu, or
- Less than 1000g U235 if contaminated with very low enriched uranium (<1.6% U235 w.r.t. U) and less than 15g Pu.

There is no restriction on the quantity of natural or depleted uranium that may be present.

L-2.3.2. Np-237

The Np237 inventory per Low Level Waste consignment* must not exceed 4 GBq per Te or 140 GBq in total.

L-2.3.3. Other radionuclides

The inventory of a single nuclide may exceed the activity limit in Table 1 by a factor of 10 provided the activity of all other nuclides remains below the specified limits.

Table 1

Nuclide	Limit	Nuclide	Limit	Nuclide	Limit	Nuclide	Limit
Th228	100	U236**	0.0001	Cm244	100	Cf250	10
U232**	1	Pa231	0.1	Cm245	1	Cf251	1
U233**	1	Pa232	100	Cm246	1	Cf252	1
U234**	0.01	Cm243	100	Cf249	1	Es254	10

** Criticality control is applied only where artificial means have been employed to enrich the uranium specifically in these isotopes



3. Waste Packaging

Waste for grouting shall be in Disposal Containers as listed below Section III. Waste that cannot be readily consigned in approved waste containers may be acceptable for disposal in other containers as approved. Such disposal methods will require justification, (for example by BPM and/or BPEO assessment), and will require prior approval by LLW Repository Ltd using the Waste Consignment Variation Form.

L-3.1. Acceptable Containers

Container Type	Design Number	Column A (Tonne)	Column B (Tonne)	Column C (m ³)
1/2 Height Disposal Container	2910B	35	42	19.5
1/2 Height Disposal Container	2910C	35	42	19.5
2/3 Height Disposal Container	2968	40	42	26.8
3/4 Height Disposal Container	3550	35	42	29.7
1/3 Height Fissile Disposal Container	3563	35	40	13.0
1/2 Height Fissile Disposal Container	3564	35	42	19.5
WAMAC Disposal Container	2947B	35	40	20.0
WAMAC Disposal Container	2947C	35	40	20.0
ISO Skip Disposal Container	2921B	17	22	11.4

Column A: shows the maximum gross weight (MGW) for compliance with the transport regulations for each container design. The MGW 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 MGW of the container after in-fill grouting that can be routinely handled at the Low Level Waste Repository.

Column C: shows the Gross Envelope Volume of each Disposal Container design for the purposes of calculating treatment, grouting and disposal charges.

Uncontainerised waste is not acceptable at the Low Level Waste Repository.