Lillyhall Landfill Site

Waste Acceptance Criteria (WAC)-
High Volume Very Low Level Waste (HV – VLLW) Disposal

	Name	Role
Originator	[redacted]	Atkins– Project Director Lillyhall Site Business Manager Environment Advisor
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Contents

Executive Summary

This document forms part of the Waste Services Framework Contract between FCC Environment, Atkins and the LLW Repository Ltd and its customers.

Lillyhall Landfill Site, Distington, Cumbria is owned and operated by FCC Environment and is permitted by the Environment Agency under permit CD7914, to receive and dispose of High Volume Very Low Level Waste (HV-VLLW),

It provides the Waste Acceptance Criteria for HV-VLLW being consigned to FCC Environment Lillyhall Landfill for disposal and includes details of the physical, chemical, radiological, packaging and transport requirements that waste must comply with to be accepted.

If you need any assistance or have any questions regarding this Waste Acceptance Criteria or FCC Environments Waste Services, please contact the FCC Waste Team via the contact below

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1. Introduction

This document defines the *Waste Acceptance Criteria* for the disposal of High Volume Low Level Radioactive Waste by FCC Environment at the Lillyhall Landfill Site. This disposal service is for waste that is not suitable for recycling or treatment, or has not been selected for treatment through Best Available Techniques (BAT) considerations and for *Secondary Waste* produced as a by-product of a treatment service.

1.1 Scope

This *Waste Acceptance Criteria* (WAC) document represents the full requirements for the packaging, receipt and disposal of *HV-VLLW* at the Lillyhall Landfill Site. The criteria apply to each Waste Consignment.

1.2 Service Supplier

The *HV-VLLW* disposal Service is provided and managed by *FCC Environment* at the *Lillyhall Landfill Site, Nr Distington* in West Cumbria. The site is available for deliveries between the times of 7.00 and 15.30 Monday to Friday.

1.3 Process

HV-VLLW *Consignments* are received at the Lillyhall Landfill Site for disposal. Following receipt and monitoring, the waste is disposed of by *FCC Environment* in a dedicated mono-cell in the case of asbestos and in a non hazardous cell for all other waste streams.

1.4 Waste Acceptance

Waste acceptance is based on the current permit CD7914 and flow down conditions into the sites Environmental Safety Case, key requirements are that radioactive waste can only be accepted for disposal if:

(a) “it is high volume very low level waste”;
(b) “it fulfils the relevant waste acceptance criteria & basic characterisation requirements”
(c) “it has not been diluted or mixed for the purpose of meeting the definition of high volume very low level waste or the relevant waste acceptance”

For a *Waste Consignment* to be accepted by *FCC Environment*, it must satisfy the criteria detailed in this document.

Waste is accepted for disposal at the *Lillyhall Landfill Site* based on sufficient annual and lifetime Volumetric and *Radiological Capacity*.

1.5 Variations

Variations to or waiver of the criteria defined in this document are not allowed in any circumstance

1.6 Non-Compliant Waste

Any non-compliant wastes *Consigned* to *the* Lillyhall Landfill Site will be quarantined pending a formal investigation and may require collection by the customer (or their agent) in accordance with the HV-VLLW site acceptance procedures.

2. Waste Acceptance Criteria

2.1 Physical and Chemical Properties

HV-VLLW for disposal at the site shall not include:

- Hazardous Wastes (other than asbestos wastes where the only hazardous component present is the asbestos itself);
- Whole or shredded tyres;
- Free liquids;
- Unknown chemicals;
- Pharmaceutically active materials;
- Complexing or chelating agents;
- Ion exchange materials;
- Wastes that are capable of generating toxic gases; and
- Wastes capable of causing an explosive, corrosive, oxidative or flammability hazard.
- Additionally, Wastestreams must not be mixed with other wastestreams or with non-waste materials solely for the purpose of meeting waste acceptance criteria.

Wastes must also meet the requirements of the Waste Hierarchy and be fully characterised by the waste producer with regard to their composition.

Characterisation will confirm that the waste stream is classified as Non-Hazardous Waste and whether it is permitted for disposal under the site's Environment Permit. Accordingly, the waste producer will be required to provide adequate information to confirm the characterisation. This will entail the provision of at least:

- The quantity of waste to be disposed
- An accurate and detailed description of the physical composition of the waste
- A description of the process which generates the waste (including waste source & origin)
- The correct EWC Codes(s) for the waste

In the case of wastes where the chemical composition is not immediately apparent the waste producer will also be responsible for the provision of:

- Material safety data sheets
- Adequate chemical analysis to classify the waste

Please note that Waste Acceptance Criteria (WAC) or other leachate testing is not adequate for waste characterisation purposes.

2.2 Radiological Properties

Waste must be permitted, as set out in Tables 2 through 5 of the Lillyhall Landfill Site's Environmental Permit[1]

2.2.1 Activity Limits

All wastes must be consistent with the definition of HV-VLLW; ***the total activity concentrations must not exceed 4 Bq/g, except in the case of Tritium where the concentration must not exceed 40 Bq/g.***

In order for consignors to determine acceptability of their wastes, the individual radionuclide activity concentrations are summed and must be less than 4Bq/g for each wastestream. This will be verified in a similar manner on a consignment basis.

2.2.2 Site Control Limits

The radionuclide inventory and specific activity of the wastes are managed by FCC Environment/Atkins against the radiological limits as derived in the Lillyhall Environmental Safety Case and stipulated in the Lillyhall EA Permit (ref CD7914). The radionuclide limits are based on Environmental impacts for a range of scenarios mandated in the EA's GRA.

- **Disposal Site** – To determine the sum of fractions for the site capacity, we add the activity of the incoming wastestream or consignment (TBq) to the cumulative site inventory total and divide this by the permissive site values in Table 2 of the site permit.
- **Disposal Cell** - To determine the sum of fractions for the disposal cell, we add the activity of the incoming wastestream or consignment (Bq/g) to the cumulative cell inventory total and divide this by the permissive cell values in Table 3 of the site permit.
- **Disposal Consignment** - The specific activity of C-14 and Ra-226 (Bq/g) per consignment as per table 4 of the permit is such that:

$$(_{C\text{-}14}/\ 0.9 + {}_{Ra\text{-}226}) \leq 1$$

[1] Environment Agency, Lillyhall Landfill Site Permit CD7914 - 6th April 2011

2.3 Packaging and Transport Requirements

2.3.1 Radiation Limits

Radiation levels on the *Waste Package* - low as reasonably practicable and controlled to <5 µSv/h at contact with the *Waste Package* and <2.5 µSv/h at a distance of 1 metre from the *Waste Package*.

2.3.2 Contamination Limits

External non-fixed contamination levels on the *Waste Package* - low as reasonably practicable and not more than 0.4Bq/cm^2 for all alpha-emitting radionuclides and 4Bq/cm^2 for all other radionuclides averaged over an area of 300cm^2.

2.3.3 Package Types

The Lillyhall operations are flexible in terms of package receipt type and have the ability to receive, monitor and dispose of a variety of waste containers. Typically these can range from drummed wastes delivered on a flat-bed lorry, to standard Iso-freight containers delivered on a twist-lock chassis.
Larger items require additional lifting capability on the site, but can be accommodated

2.3.4 Site rules and instructions

All delivery vehicle drivers must observe all site rules on the Lillyhall Landfill facility. These are to include the wearing of mandatory PPE to include, but not limited to steel midsole and toe boots, a hard hat and high visibility jacket / waistcoat. All deliveries must adhere to the facilities operational hours listed above in section 1.2, deliveries outside of these hours must have prior agreement from the facility manager.

3. Appendices

Appendix 1 – Lillyhall Site EPR Permit Extracts – Site, Cell and Consignment Limits

Table 2: SITE LIMITS

Relevant values to be used in Condition 1.4.7 for calculating limitation of total Site disposals

Radionuclide or Group of Radionuclides	Relevant Site Value (TBq)
H-3	1900
C-14	84
Cl-36	0.82
Mn-54	3.6

Fe-55	650
Co-60	0.31
Ni-63	4000
Zn-65	4.9
Sr-90	2.6
Zr-95	72
Nb-95	150
Tc-99	0.02
Ru-103	430
Ru-106	78
Ag-108m	1.3
Ag-110m	1.3
Sb-125	2.2
I-129	0.15
Cs-134	9.8
Cs-137	12
Ce-144	610
Pm-147	4000
Eu-152	3.8
Eu-154	3.8
Po-210	2.9
Pb-210	2.2
Ra-226	3.7
Th-230	990
Th-232	9.2
U-234	120
U-235	19
U-238	71
Np-237	0.31
Pu-238	120
Pu-239	100
Pu-240	100
Pu-241	4000
Pu-242	100
Am-241	220
Am-243	76
Cm-242	4000
Cm-243	250
Cm-244	950
Other radionuclides[1]	4.0

1 "Other radionuclides" means any radionuclide not listed in this table and with a half-life greater than three months, or as specified in writing by the Agency

Table 3: DISPOSAL CELL LIMITS

Relevant values to be used in Condition 1.4.8 for calculating limitation of radionuclide concentration per disposal cell

Radionuclide or Group of Radionuclides	Relevant Cell Value (Bq/g)
H-3	1800
C-14	21
Cl-36	1.8
Ni-63	4000
Sr-90	7.6
Tc-99	0.33
I-129	1.8
Cs-137	18
Ce-144	4000
Sm-147	49
Sm-151	4000
Eu-154	240
Pb-210	1.9
Ra-226	0.31
Ac-227	5.2
Th-229	3.9
Th-230	33
Th-232	0.88
Pa-231	0.4
U-233	130
U-234	130
U-235	21
U-236	140
U-238	61
Np-237	8.9
Pu-238	17
Pu-239	9.4
Pu-240	9.5
Pu-241	4000
Am-241	12
Cm-244	170
Other radionuclides[1]	4.0

1 "Other radionuclides" means any radionuclide not listed in this table and with a half-life greater than three months, or as specified in writing by the Agency

Table 4: CONSIGNMENT LIMITS

Relevant values to be used in Condition 1.4.9 for calculating limitation of radionuclide concentration per consignment

Radionuclide	Relevant Consignment Value (Bq/g)
C-14	0.9
Ra-226	1.0