

UK NUCLEAR INDUSTRY LOW LEVEL WASTE STRATEGY



Briefing Paper 8 (June 2020)

1. Introduction: Low Level Waste

Low Level Radioactive Waste (LLW) makes up by far the largest portion of the UK radioactive waste inventory, but it is also the one which poses the least risks to humans and the environment.

LLW has been produced, managed and disposed of in the UK since the 1920s and is generated by a range of industries and processes including pharmaceutical companies, hospitals, universities, military activities and the oil and gas industry. Since the 1950s, the largest source of LLW generation has been from the operation and decommissioning of nuclear power stations. Decommissioning LLW mostly comprises building rubble, soil and various other items including metallic wastes.

LLWR Ltd. has responsibility for the management of LLW from the nuclear industry, undertaking this on behalf of the **Nuclear Decommissioning Authority (NDA)**.

LLWR Ltd operates the national **Low-Level Waste Repository**, near Drigg in West Cumbria. Historically this was the destination for much of the UK's LLW. However, application of the waste hierarchy, and the opening up of new treatment and disposal routes, has meant that in recent years much material (over 90%) has been diverted from disposal at LLWR through recycling or by being sent for incineration or super-compaction. Much **Very Low Level Waste (VLLW)** is sent to specialist landfill sites at King's Cliffe in Northamptonshire, Lillyhall in Cumbria and Clifton Marsh in Lancashire. Some higher end LLW is not suitable for disposal at the LLWR and has to be managed in a similar way to Higher Activity Waste (HAW).

2. Overview of the UK Strategy for the Management of LLW from the Nuclear Industry (LLW Strategy)

Published in February 2016, the refreshed strategy was prepared by the Nuclear Decommissioning Authority (NDA) on behalf of the UK Government and is published jointly by the UK Government and the devolved administrations.

The current strategy builds on the policy for the long-term management of solid LLW in the UK, published in 2007. It maintains the same three strategic themes of the earlier documents, namely:

- The application of the waste hierarchy and a move away from the past focus on disposal;
- Making best use of existing LLW management assets, particularly the LLW Repository (LLWR) near Drigg in Cumbria; and
- The need for new fit-for-purpose waste management routes.

It also recognises the significant changes that have occurred since 2010 in the way LLW is managed. These include:

- The diversion of significant volumes of LLW from the Low Level Waste Repository (LLWR) site;
- The development and use of alternative treatment and disposal routes;
- The application of the waste hierarchy by waste producers when making waste management decisions;
- The identification of opportunities for improvement and the sharing of good practices for LLW management; and
- The engagement of a broad group of stakeholders within the process.

The strategy is primarily aimed at nuclear industry waste producers, the waste management industry, environmental regulators and waste planning bodies, and will also apply to new nuclear sites as they are developed. It sits alongside strategies for the management of **Non-nuclear LLW**¹ and for **Naturally Occurring Radioactive Material (NORM)**².

The Strategy also notes that the correct links need to be made between management of LLW and of Higher Activity Waste (HAW) and that the classification of LLW and HAW do not translate into clearly defined management routes. In other words, some LLW will need to be managed as HAW, and some HAW could potentially be disposed of within an LLW facility.

The NDA published a **Radioactive Waste Strategy** in late 2019³. This applies to all radioactive waste generated by the NDA estate. It is the guiding strategy for Higher Activity Waste (HAW) and sits alongside and is consistent with the LLW Strategy. NuLeAF has long argued for better integration of HAW and LLW, and also for better integration between radioactive material that arises from nuclear and non-nuclear sources. We are therefore supportive of this integrated framework. More information on the Radioactive Waste Strategy is provided in **Briefing Paper 11**.

3. Principles of the LLW Strategy

The LLW Strategy identifies a number of key principles for the management of LLW which build on the principles of the 2007 Policy. These represent the expectation for

¹<https://www.gov.uk/government/publications/strategy-for-the-management-of-solid-low-level-radioactive-waste-from-the-non-nuclear-industry-part-1-anthropogenic-radionuclides>

²https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335821/Final_strategy_NORM.pdf

³ <https://www.gov.uk/government/consultations/nda-radioactive-waste-management-strategy>

implementation of the strategy by waste producers, planning authorities, regulators, NDA and the supply chain:

- High standards of health, safety, security, environmental protection and public engagement are essential to the development of appropriate waste management plans and their implementation;
- The waste hierarchy should be implemented by all producers of LLW;
- Application of Best Available Techniques (BAT)/Best Practical Environmental Option (BPEO)/Best Practical Means (BPM) by all producers of LLW – referred to as BAT in the rest of this document;
- Effective characterisation and segregation of waste is crucial to flexible management of LLW;
- Given the diverse physical, chemical and radiological nature of LLW, the availability of proportionately regulated waste management routes is essential;
- The development of new waste routes or approaches to the management of LLW requires appropriate engagement with local and national stakeholders;
- Availability of robust, sustainable waste management infrastructure is essential for continued operations, hazard reduction and decommissioning;
- Waste management decisions should be supported by sound business cases;
- Integration of strategies for all waste (both radioactive and non-radioactive, controlled waste) is important nationally and at site level; local waste strategies and plans will be consistent with, and complement, national strategy and policy;
- Best practices in waste management and any relevant learning from experience is shared across the nuclear industry, including new build;
- Problematic wastes should be dealt with at the earliest practical opportunity and successful outcomes shared with other waste producers;
- Opportunities to safely manage wastes at the boundary between LLW and Higher Activity Waste (HAW) as LLW should be considered within waste management decisions making.

4. Waste Management planning and decision making

The **LLW Policy 2007** requires waste managers to develop an LLW Management Plan, taking account of current and future arisings of LLW. There should be a clear emphasis on appropriate engagement with stakeholders and agreement with the regulators. Decisions should be taken through the application of the BAT and supported by robust waste forecasts. Underpinning everything should be the proper application of the waste hierarchy (Fig 1).

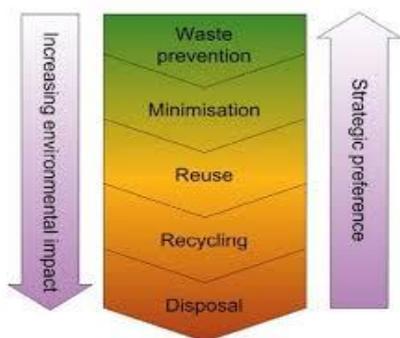


Figure 1: Waste Hierarchy

The 2016 Strategy notes the following:

Waste Prevention	There is significant opportunity to avoid the generation of LLW. The strategy also recognises a hierarchy for waste prevention: <ol style="list-style-type: none"> 1. Avoid creating any waste 2. Avoid creating radioactive waste 3. Avoid creating any radioactive waste with activity above defined out of scope levels
Minimisation of Waste	Where wastes cannot be prevented, they should be minimised in terms of both volume and level of activity. Separation or segregation of wastes can help to limit the amount of LLW to be managed, moving other materials out of scope. Decay storage can also be used. This is particularly where materials have a short half-life.
Reuse	Appropriate reuse is the next step on the hierarchy. Soil and rubble can be reused on sites for landscaping and void filling, although this requires appropriate regulation. The regulators are working with NDA, Government, NuLeAF and others to develop guidance that will provide clarification on this issue.
Recycling	Techniques such as surface decontamination or melting can help recycle material, as can more effective characterisation. This has proved particularly helpful in managing metallic materials.
Disposal	While some material, due to its properties, continues to require disposal at the LLWR site, the overall aim of the strategy is to minimise the amount of material to be disposed of and to also look at alternatives to the LLWR. These alternatives include on-site disposal at NDA sites, the use of suitably permitted landfill sites, and the use of alternative engineered sites such as at Dounreay. Some of the alternative disposal options have caused concerns among local authorities, particularly where on-site disposal might impact on plans for site remediation; or where material previously destined for the LLWR is consigned to appropriately permitted landfill sites within the council area.

5. Transportation of LLW

The Strategy recognises that transport of LLW is a significant concern for communities and stakeholders (see section 2.53 of the strategy), with impacts related to the number of movements, the distance travelled and the transport mode used. The Strategy notes the need to consider transport impacts while also balancing them with the *'practicalities of alternatives and the relatively low risk presented by the transport of LLW.'*

6. Engagement of NuLeAF and Local Authorities

The 2016 LLW Strategy reiterates earlier strategy commitments to engagement and identifies NuLeAF and local authorities as key stakeholders and partners (3.4). The Strategy states that:

'waste managers and facility operators should recognise the importance of early dialogue with local government decision makers (e.g. waste planning authorities in England) to help inform the preparation of local waste development documents and the handling of planning applications. It is important to work in constructive partnership with local government decision makers.' (3.3)

There is also acknowledgement that:

'Radioactive waste, even LLW and VLLW, can raise particular concerns for the public and local communities...(and) it is essential to undertake careful and considered engagement with local communities early in the waste management planning and decision making process, particularly where the implementation of this strategy leads to proposals for new waste management facilities or changes in approach to LLW management. Such engagement needs to be open and transparent in order to build confidence and credibility.' (3.5 and 3.6)

NuLeAF and LLWR host an annual meeting between local planning authorities, LLWR, and the supply chain⁴ to update local government on upcoming plans for the management of LLW and to discuss any issues that have or may arise.

NuLeAF also sits on the **LLW Strategy Delivery Overview Group (DOG)** and in other meetings hosted by the **National LLW Programme**⁵ managed by LLWR. The outcomes of these meetings are reported back and discussed at NuLeAF's Steering Group and Radioactive Waste Planning Group (RWPG)⁶.

In line with the strategy, Local Authorities should expect direct engagement when proposals for LLW management affect their area, and also have a crucial role to play

⁴ <https://www.nuleaf.org.uk/wp-content/uploads/2019/10/Presentation-slides.pdf>

⁵ <http://llwrsite.com/national-waste-programme/>

⁶ <http://www.nuleaf.org.uk/document-library/rwpg-notes>

through taking account of LLW within their minerals and waste local plans. This issue is explored in more detail in Section 7 below.

7. Interactions with Planning Authorities and implications for local plans

The Strategy identifies **Waste Planning Authorities** as key stakeholders and stresses the need for them to reflect the LLW Strategy within their minerals and waste local plans.

NuLeAF has been active in encouraging Planning Authorities to address radioactive waste management in plans. This has helped contribute to a situation where local plans and waste plans in areas hosting nuclear sites have clearer and stronger policies on radioactive waste than was previously the case. As noted in section 4, NuLeAF's Radioactive Waste Planning Group provides a forum for planning authorities to discuss issues around land use and waste planning, and to help maintain the requirements of the Duty to Co-operate.

For more information on this issue, local authorities should refer to NuLeAF **Briefing Paper 11 on Approaches to Waste Management in Local Plans**⁷ which provides detailed guidance on these issues and on how the **Duty to Co-operate** should be addressed. It proposes that Local Plans that include waste policies should state clearly how/where radioactive waste arising within the area will be managed, with appropriate engagement to meet the Duty to Co-operate.

Briefing Paper 11 proposes the following potential options could be considered in drawing up local planning authority policy for low level radioactive waste disposal:

- For nuclear industry wastes, the preferred location for LALLW/VLLW disposal may be within the nuclear site where it arises. The UK Government and NDA is developing a new approach based on Proportionate Regulatory Controls (PRC)⁸ that will enable the disposal of lower level radioactive waste in situ or on site where that is demonstrated to be the best option in terms of safety and environmental impact. Guidance on this issue for Local Planning Authorities will be published later in 2020.
- Alternatively, where there is an aspiration for a particular end state that radioactive waste disposal would conflict with, and de-licensing, the preferred location is likely to be off site;
- If those assessments do not identify any practicable solutions then the use of existing or proposed conventional sites within the WPA's area should be considered; or,
- If none of those sites has the potential to dispose of those wastes, and the preferred option is for such wastes to go to other areas, the Duty to Co-operate will be relevant and the policy would need to be developed through engagement with the relevant WPA(s).

⁷ <http://www.nuleaf.org.uk/wp-content/uploads/2015/12/BP23-Radwaste-and-local-plans-updated-final.pdf>

⁸

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/705217/Regulation-of-nuclear-sites-in-the-final-stages-of-decommissioning-and-cleanup-consultation.pdf

- Proposals involving transfers of radioactive wastes to an existing or new facility should demonstrate that a) they are fully justified based on assessments of national and sub-national need, and that all other options within the area within which the wastes arise have been rigorously assessed; b) they do not have unacceptable impacts; c) local social and economic benefits outweigh any adverse impacts; d) they are acceptable to the host community;
- For non-nuclear industry LALLW/VLLW, the deliverability and viability of any possible existing or future sites should be assessed. This should be informed by the waste hierarchy with disposal to landfill the last option. If it is not possible to manage wastes within the WPA, the Duty to Co-operate will be relevant for any policy that relies on such wastes going to other areas.

While this Briefing is focussed on LLW, Local Plans should also address all aspects of nuclear and radioactive waste management, including the storage of Higher Activity Wastes (HAW) on site pending disposal in a Geological Disposal Facility.

One issue on which the 2016 LLW Strategy is silent is on community benefits, which to date have been established on an ad-hoc basis. LLWR supports the **Copeland Community Fund**⁹, while Augean provides funding to communities around the **King's Cliffe** site¹⁰ in recognition of its use for the disposal of a range of material, including VLLW.

NuLeAF's **Policy Statement 7**¹¹ sets out the organisation's position on community benefits and investment, while further information is provided by **Briefing Paper 13**¹².

⁹ <http://www.copelandcommunityfund.co.uk/>

¹⁰ <http://grantscape.org.uk/fund/augean-community-fund/>

¹¹ <https://www.nuleaf.org.uk/wp-content/uploads/2020/02/NuLeAF-Policy-Statement-7-Community-Benefits-final.pdf>

¹² <https://www.nuleaf.org.uk/wp-content/uploads/2020/02/Briefing-Paper-13-Community-benefits-final.pdf>

Glossary

A. Categories of radioactive waste

Higher Activity Waste (HAW)

HAW encompasses Higher Level Waste, Intermediate Level Waste, and a portion of Low Level Waste that cannot be disposed of in the Low Level Waste Repository. It is intended that HAW from England and Wales is disposed of in a Geological Disposal Facility (GDF).

Higher Level Waste (HLW)

This is highly radioactive and generates substantial amounts of heat. It is produced as a by-product of reprocessing spent fuel at Sellafield in Cumbria.

Intermediate Level Waste (ILW)

The radioactivity level is higher than that of Low Level Waste, but it doesn't generate heat to the same degree as HLW. ILW is sufficiently radioactive to require shielding and containment. It arises mainly from reprocessing of spent fuel, and from operations and decommissioning at nuclear sites. ILW includes, for example, nuclear fuel cladding and nuclear reactor components, graphite from reactor cores and sludges from the treatment of radioactive liquid.

Low Level Waste (LLW)

Unlike HLW and ILW, LLW does not normally require shielding during handling or transport. It tends to consist largely of paper, plastics and scrap metal items which have been used in hospitals, research establishments and the nuclear industry. As the decommissioning of nuclear power stations progresses, it will also include increasing amount of soil, concrete and steel.

Very Low Level Waste (VLLW)

This is a sub-category of LLW, consisting of the same sorts of materials, but is the least radioactive and does not require specially designed containment. It is divided into Low Volume ('dustbin loads') coming mainly from hospitals and universities, and High Volume ('bulk disposal') from nuclear sites.

Low Activity Low Level Waste (LALLW)

A sub-set of LLW which is below a certain threshold of radioactivity.

Out of scope wastes

Material that is so low in radioactivity that the risks to humans and the environment can be classed as negligible.

Non-nuclear LLW

A range of processes and industries outside the nuclear industry produce LLW. These include hospitals, research facilities, military uses and certain industries. There is a separate Government strategy to manage non-nuclear LLW.

Naturally Occurring Radioactive Material (NORM)

NORM consists of materials, usually industrial wastes or by-products, which contain naturally occurring radioactive materials which have been concentrated by the nature of certain industrial processes. Within the UK a range of industries including oil and gas, produce such NORM wastes. There is a separate Government strategy for the management of NORM.

B. Other terms

Best Available Techniques (BAT)/Best Practical Environmental Option (BPEO)/Best Practical Means (BPM)

These are regulatory terms used to define approaches that limit discharges or impacts on the environment. While the concepts are similar, different terms are applied in different parts of the UK.

Decay storage

Radioactivity decays over time, though the rate at which this happens varies greatly between different radioactive substances. Decay storage is a means of managing radioactive materials and in particular short lived LLW. Through allowing its decay in situ, the radioactivity of material can be reduced and thus it can be managed in simpler, more cost-effective ways.

Duty to Co-operate

The Duty to Co-operate is a legal duty on local planning authorities, county councils and public bodies in England to actively engage in a constructive and ongoing basis to maximise the effectiveness of Local and Marine Plans and their cross border impacts.

C. Organisations

Environment Agency (EA)/Natural Resource Wales (NRW)

Government bodies responsible for granting environmental permits in England and Wales respectively.

Nuclear Decommissioning Authority (NDA)

A Non-Departmental Public Body established by the Energy Act 2004, and fully funded by Government, responsible for decommissioning 19 civil nuclear sites formerly owned by BNFL and the UKAEA.

Office for Nuclear Regulation (ONR)

The ONR is tasked with providing an efficient and effective regulation of the nuclear industry, holding it to account on behalf of the public.

Parent Body Organisation (PBO)

A commercial organisation contracted by the NDA to take ownership of Site License Companies at NDA sites, and provide senior management.

Site License Company (SLC)

The body which is licenced by ONR to operate a nuclear site.