

What is Low Level Waste?



Definition of radioactive waste

The Office for Nuclear Regulation states that:

Radioactive waste is any material that is either radioactive itself or is contaminated by radioactivity, and for which no further use is envisaged.

What do we mean by contamination and activation?

Objects or materials may become contaminated with radioactive deposits when they come into contact with radioactive materials or airborne particulates. Contamination can be physically bound to the surface, or it can be loose and easily spread. Typical examples of wastes that become contaminated include tools, filters, protective clothing, and components such as pipes and tanks.

Objects or materials that are activated by radiation must have been exposed to a strong source of neutron radiation and so become radioactive themselves. This typically occurs in the core of the nuclear reactor. Examples of waste that become radioactively activated in this way include graphite bricks, fuel cladding, monitoring equipment and pipework.

Classification of radioactive waste

In the UK, solid radioactive wastes are defined according to their radiological properties into three categories: low, intermediate and high level wastes.

Low Level Waste (LLW) lies at the bottom end of the radiological spectrum and is a broad category, ranging from waste that has very low levels of radioactivity to waste that may require engineered shielding.

The UK's LLW national policy¹ also introduced a sub-category of LLW known as Very Low Level Waste (VLLW). This category of waste has activity levels that are at the lower end of the LLW activity limit and may be managed by disposal to suitably permitted conventional landfill sites.

Who produces Low Level Waste?

Solid radioactive wastes have been produced, stored and disposed of by various industries in the UK since the 1920s. The main sources of waste generation since the 1950s have been:

- nuclear energy development and decommissioning
- nuclear power generation
- and the defence industry.

In addition, hundreds of non-nuclear industry users of radioactive materials produce radioactive waste, for example:

- universities
- hospitals
- the pharmaceutical industry
- research establishments
- and the oil and gas industry.

The majority of UK LLW (by volume) arises at nuclear sites undertaking the following activities:

- fuel fabrication and uranium enrichment
- nuclear power generation
- spent fuel reprocessing
- decommissioning and clean-up of nuclear sites
- nuclear energy research and development
- Ministry of Defence activities
- and the manufacture of radioactive medical products.

What does Low Level Waste look like?

Any object or material that becomes contaminated or activated could end up as LLW; it could be a piece of paper, a drill, building rubble or specialised parts from a nuclear reactor.

LLW includes operational and decommissioning wastes:

- Operational LLW typically arises from routine monitoring and maintenance activities, and includes plastic, paper, tissue, clothing, wood and metallic items.
- Decommissioning LLW mostly comprises building rubble, soil, and various metal plant, equipment and items.

¹ Policy for the Long Term Management of Solid Low Level Radioactive Waste in the United Kingdom, March 2007.

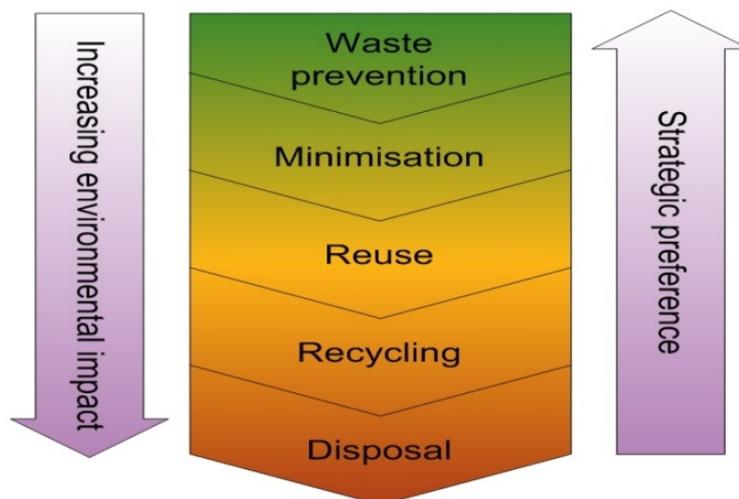
What is the Waste Hierarchy?

The Waste Hierarchy, illustrated below, is a waste management principle that ranks a list of waste management options (waste prevention, minimisation, reuse, recycling and, least preferred, disposal) according to their environmental impact. Where practicable, waste producers should seek to move the management of their wastes up the hierarchy in order to minimise environmental impact.

A requirement to consider the Waste Hierarchy in the management of all waste is enshrined in the 2007 UK LLW Policy, in environmental regulations and in European Directives.

It is also a cornerstone of the National LLW Strategy. The Strategy recognises that the UK's disposal capacity is a precious, finite resource and that waste producers must continue to move away from reliance on disposal at the LLWR and other disposal sites.

The Waste Hierarchy



In practical terms, the Waste Hierarchy should be applied to LLW with due consideration of other factors such as worker and public dose, cost and technical viability over the full lifecycle of the waste.

Further information on the Waste Hierarchy

A Waste Hierarchy guidance document can be downloaded from the Practitioner Guidance section of NWP website.

To learn more about waste management and the Waste Hierarchy, you can take, free of charge, the NWP e-learning modules: *Introduction to Waste* as well as the *Introduction to Low Level Radioactive Waste*.