GDF

2

The science files

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What will go into a GDF?

Nuclear Waste Services

What will go into a GDF?

What is radioactive waste?

Radioactive waste is radioactive material for which we have no further use. Most of the UK's radioactive waste contains only low levels of radioactivity and is already being safely disposed of at dedicated surface-based disposal facilities, including the Low Level Waste Repository (LLWR) in West Cumbria and the Low Level Waste Facility next to the Dounreay site in Scotland. In addition, some Very Low Level radioactive waste is being safely disposed of at certain conventional landfill sites.

A Geological Disposal Facility, or GDF, will be used to dispose of higher activity radioactive waste from England and Wales. This consists of:

High Level Waste (HLW) – this comes from the reprocessing of spent fuel used in nuclear reactors. This liquid waste is made into a solid glass in a process called "vitrification". HLW generates a lot of heat, and this needs to be factored into GDF design.

Figure 1: Stainless steel canister containing vitrified High Level Waste.

Figure 2: High Level Waste store at Sellafield.

Intermediate Level Waste (ILW) – which comes from the operation and decommissioning of nuclear power plants and other nuclear facilities. Any liquid ILW is converted to a solid by mixing it into materials such as cement. You can see what a package of ILW mixed with cement looks like on the front cover of this document.

Figure 3: Intermediate Level Waste store at Berkeley.

A small amount of **Low Level Waste (LLW)** which can't be safely disposed of in existing surface disposal facilities. LLW can be any material that has been contaminated by radioactivity. It includes soil, rubble and building materials from nuclear sites and protective clothing which has been worn in nuclear facilities.

There are also some radioactive materials that are not currently counted as waste as it is not yet certain whether they will have further use.

These materials include some spent fuel as well as plutonium and uranium. We include these materials in our planning as they would need to be managed through geological disposal if it were decided at some point that they had no further use and are therefore waste.

How much will there be?

Higher activity radioactive waste destined for a GDF already exists and is currently being stored at over 20 nuclear sites around the UK.

Figure 4: Sites where higher activity waste destined for a GDF is currently stored.

More will be produced, mainly through the operation of existing and planned nuclear power stations, but also from uses of radioactive materials in medicine, industry, research and defence.

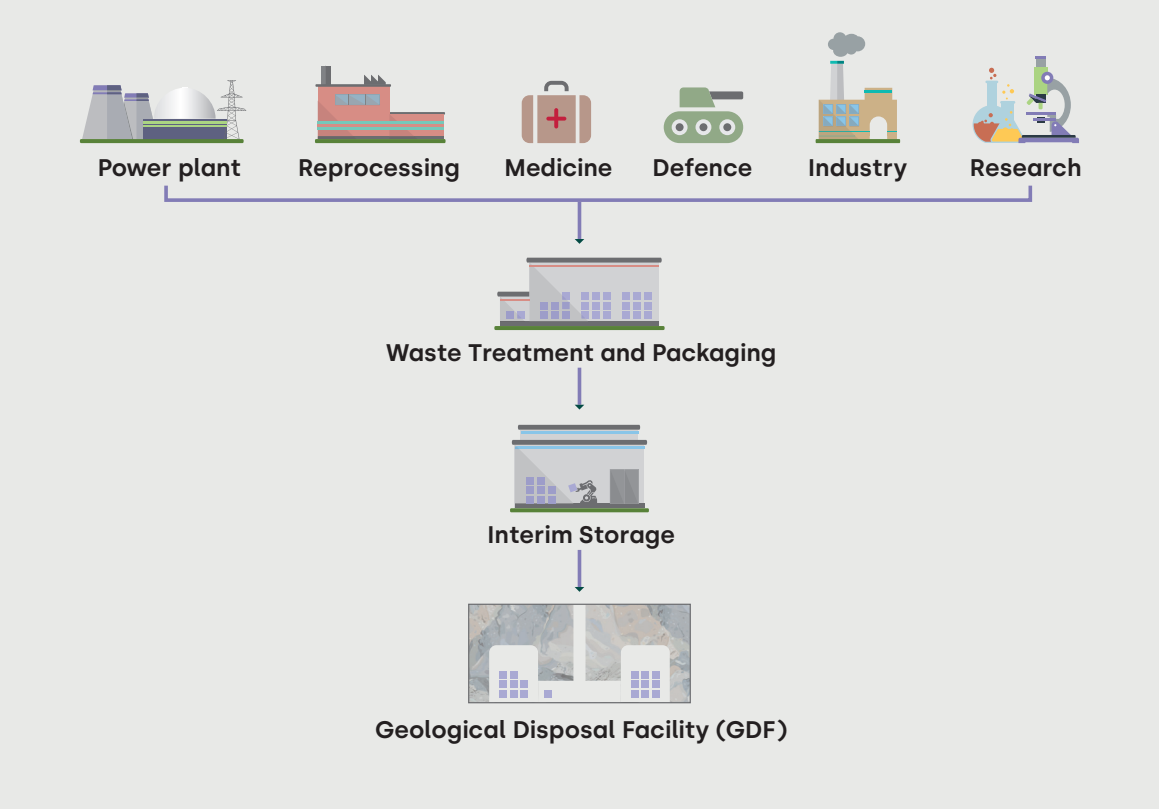

Figure 5: Sources and management of radioactive waste in the UK.

The amount of packaged higher activity waste requiring geological disposal will depend on:

1. How we use radioactive materials in the future and how much more waste this produces.
2. Whether existing radioactive materials such as plutonium are declared as waste.
3. How the waste is treated and packaged, ready for disposal.

Our latest estimate is that around 650,000 cubic metres of higher activity waste and nuclear materials will be sent to a GDF, but this may change. That's roughly half the size of Wembley stadium. Most of this volume is ILW and LLW.

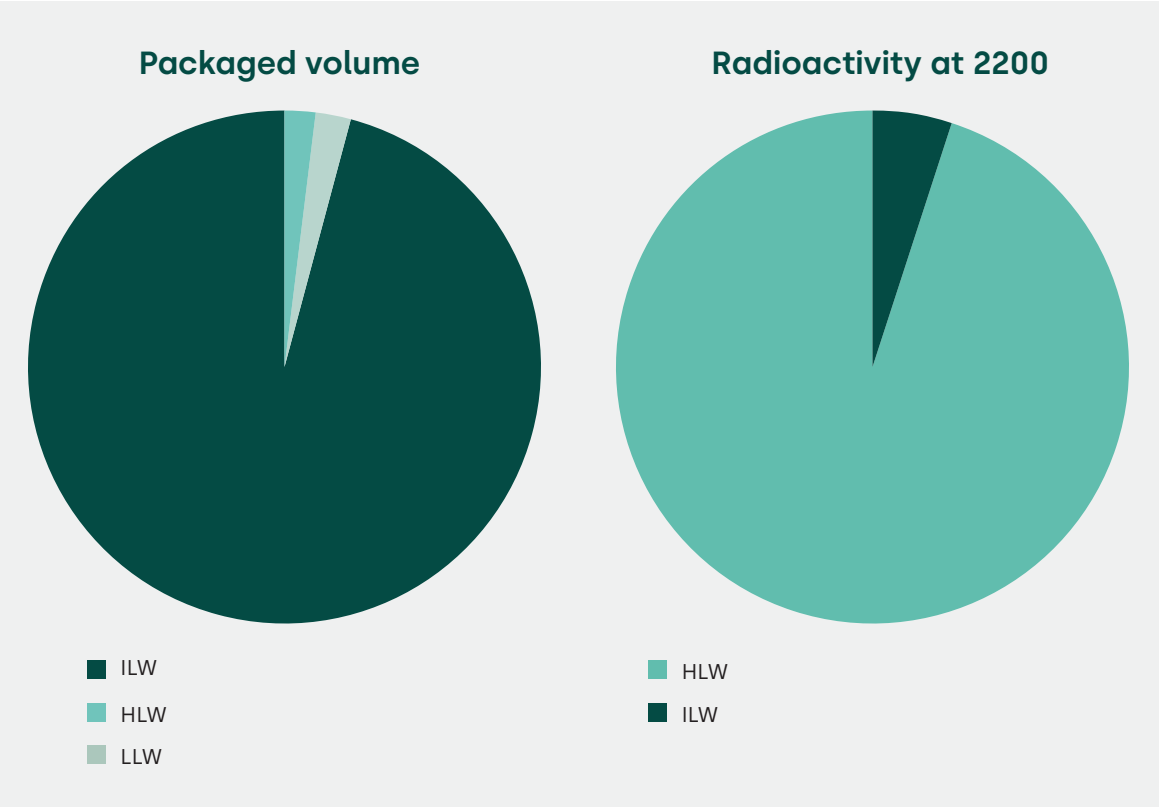

Figure 6: Contributions of different types of radioactive wastes destined for geological disposal by volume (left) and radioactivity (right).

To find out more, go to part 3 of The science files: 'The multi-barrier approach.'