



Radioactive waste: siting a repository

The BGS is providing expert, impartial advice to government

What is radioactive waste?

Radioactive waste arises from nuclear power generation, defence related activities and medical applications. Radioactive waste emits radiation which can be harmful to humans and other organisms. The waste must be isolated to protect surface and near-surface environments. Some high level radioactive waste also generates heat, which is a factor in the design of storage and disposal facilities. The BGS is helping to identify a site for a long-term storage facility for the UK's intermediate and high level radioactive waste.

How long does the radioactivity last?

Radioactive materials become less hazardous over time because of radioactive decay. However, some of our most radioactive waste will continue to emit significant levels of radioactivity for hundreds of thousands of years.

Who is responsible for radioactive waste?

The UK Government has responsibility for the country's existing radioactive waste. In 2001 the Government set up the Managing Radioactive Waste Safely (MRWS) programme which was tasked with producing a long-term solution for the UK's radioactive waste. Following consultation, the Committee for Radioactive Waste Management (CoRWM), established under MRWS, recommended deep geological disposal for the

safe management of the UK's waste. It also recommended that the siting of such a facility, known as a repository, should be undertaken by a process of voluntarism and partnership. The Government accepted these recommendations and in 2008 published the MRWS white paper, 'A framework for implementing geological disposal', together with a call for volunteers.

How does the BGS advise government?

Communities in west Cumbria have expressed an interest in hosting the repository. Because of our expertise and impartiality, the BGS was identified in the MRWS white paper to undertake screening of the areas covered by the expression of interest on behalf of the Government. This screening was the application of criteria defined in the white paper to eliminate from further consideration any areas that are clearly unsuitable for the deep disposal of radioactive waste from the geological point of view. This desk study, reviewing the geology of the nominated area of west Cumbria was completed in October 2010.

"The UK Government identified the BGS to provide expert and impartial advice in the process of identifying a site for long-term radioactive waste repository"
Richard Shaw, BGS

How will the repository site be selected?

Once the current expression of interest advances to formal participation, the Nuclear Decommissioning Authority's Radioactive Waste Management Directorate will have responsibility for desk-based studies of the areas not excluded by the screening to identify potential repository sites. This will be followed by surface-based field studies, such as geological mapping, and geophysical surveys, to gain understanding of the deep geology. Intrusive studies, such as drilling boreholes, will then be undertaken to confirm the geological and hydrogeological understanding of the sites prior to final site selection and underground investigations that may eventually lead to the construction of a repository. The first waste to be deposited in the repository should be emplaced in around 2040.

What features should the deep geological repository have?

The deep geological repository will need to contain the waste and the radioactivity it emits for many thousands of years. Suitable geological environments include thick mudrocks, salt and hard rocks with low

Factfile

- The UK's deep geological repository will be somewhere between 200 and 1000 m deep.
- A 'footprint' of some 4 km² will be needed to house the UK's current radioactive waste: equivalent to over 500 football pitches in area.
- About 90% by volume of the UK's radioactive waste is low-level waste (LLW) which contains less than 0.0003% of the total radioactivity.
- In around 600 000 years high-level waste (HLW) will be less radioactive than the ore deposit that the uranium was originally mined from.

groundwater flow. Construction of the repository within aquifers where groundwater flows may be high will be avoided. The repository will comprise both natural and engineered barriers to prevent radioactivity from being transported to the surface or near-surface environments by the movement of solids, liquids, gases or microorganisms.

How will BGS research improve the repository design?

The BGS were first consulted about geological repositories in the mid-1950s. We have a long track record of research into the movement and fate of radioactivity in the subsurface environment. Some of our current projects in this field are introduced in a separate briefing note. Our findings will contribute to the design of a safe, cost-effective repository which ensures long term isolation of the waste and the radioactivity that it contains from the surface and near-surface environment.

What skills and facilities does the BGS have?

The BGS has highly experienced staff complemented by our state-of-the-art research laboratories. Our research is supported by our extensive data holdings and sample stores.

Providing expert, impartial advice

The BGS's extensive experience and body of knowledge, combined with our impartial position as a publicly-funded organisation, means that policy makers are able to trust our judgement when they need advice on radioactive waste disposal issues.



An experiment in the Bore Underground Research Laboratory where claystone at a depth of 490 metres is being evaluated for the disposal of French radioactive waste.



More information: www.bgs.ac.uk/radwaste

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