Journal of Geology & Geophysics
ISSN: 2381-8719
OPEN ACCESS Freely available online
Opinion Article

Radioactive Waste Disposal in the UK through Deep Geological Methods

Richard Orville*

Department of Atmospheric Sciences, Cooperative Institute for Applied Meteorological Studies (CIAMS), Texas A&M University, Texas, USA

DESCRIPTION

The nations that have used nuclear materials for defence, power generation, and medical purposes, disposing of radioactive waste is a serious problem. To solve this issue, many nations with advanced nuclear businesses, like the UK, have chosen deep geological burial. But unlike other subsurface operations, geological disposal of radioactive waste necessitates extensive analysis in order to comprehend the effects of possibly fugitive radionuclides for up to 1 million years in the future. This timeline shows how long it takes for typical waste materials' radioactivity to naturally decay to an acceptable risk level. Placement of wastes within an engineered facility (known as a Geological Disposal Facility, or GDF), built at depths of hundreds of meters below the surface, using the local geological environment as one of the containment barriers, is a crucial part of deep geological disposal. The geological environment must meet several essential criteria, including being largely stable and having enough predictable behaviour. The requirement to conduct scientifically reliable assessments of a disposal facility's long-term radiological safety gives rise to the demand for predictability.

It is essential to take into account natural processes that can have an impact on a GDF's long-term safety functionality or alter its geological surroundings. Predicting these changes, however, is very difficult due to the intrinsic uncertainty of geological process rates, critical thresholds, and the impact of unforeseen perturbations. For example, a one million year time frame is a very short period of geological time and is significantly below the resolution of observation of prior plate-tectonic activities when evaluating the processes that may have an impact on the geological environment surrounding a GDF. Similar to this, predicting the evolution of the climate system on such time spans is extremely difficult and depends on determining the extremes within which the climate and associated processes may fluctuate with fair confidence.

In areas of the earth where tectonic activity is present and/or there has recently been a glacial, these factors are often evaluated using a deterministic analysis that is informed by direct observation of the impacts. However, due to the UK's intraplate location, which has been mostly glacier-free for the last 11.5 kyr and has modest tectonic activity, judgement must be based on a growing body of circumstantial evidence, modelling, and probabilistic analysis.

Since the 1940s, the UK has amassed a sizable legacy of radioactive waste as a pioneer in the development and application of nuclear technology. In view of the UK Government's assumption that nuclear power will play a part in the nation's future energy mix, aiding in the effort to meet the task of decarbonizing our energy supply, it will continue to do so for decades to come. It is anticipated that 1.1 million m^3 (2.6 million tonnes) of high level waste will need to be safely treated by the end of this century.

Although the UK has not yet chosen a location for a GDF, a fresh initiative to conduct geological disposal was introduced in 2014. As part of their site inquiry programmes, other northern countries with programmes for the disposal of radioactive waste, such Sweden, Finland, and Canada, have evaluated potential future natural processes. All of these evaluations are somewhat relevant to particular circumstances in the UK. In contrast to these other analyses, the UK's location on the northern edge of Europe and its extremely diverse geology and geography indicate that it has unique characteristics that are likely to affect potential future natural change. Reviewing the understanding of the natural changes that may affect the location and design of a GDF in the UK is one of the issues facing deep geological disposal initiatives in such intraplate settings.

In the UK, site selection procedures for the underground geological burial of radioactive waste are being guided and informed by assessments conducted on a national basis. Site-specific studies will need to be conducted as the site selection process progresses forward and sites are identified for in-depth research. This is because a large portion of the understanding of future natural change necessary for the site's safety argument is site-specific. These will take into account the host rock's and the area's geological features, as well as how they are anticipated to react to the aforementioned natural changes and, in fact, how they may have been impacted by such events in the past.

Correspondence to: Richard Orville, Department of Atmospheric Sciences, Cooperative Institute for Applied Meteorological Studies (CIAMS), Texas A&M University, Texas, USA, E-mail: orvillerich34@gmail.com

Received: 01-Nov-2022; Manuscript No. JGG-22-21110; **Editor assigned:** 03-Nov-2022; PreQC. No. JGG-22-21110 (PQ); **Reviewed:** 17-Nov-2022; QC. No. JGG-22-21110; **Revised:** 24-Nov-2022; Manuscript No. JGG-22-21110 (R); **Published:** 01-Dec-2022, DOI: 10.35248/2381-8719.22.11.1055.

Citation: Orville R (2022) Radioactive Waste Disposal in the UK through Deep Geological Methods. J Geol Geophys. 11:1055.

This knowledge will be put to use to provide a comprehensive picture of how a region's subsurface environment has changed over time, particularly over the last tens of thousands to a few million years. The level of knowledge and awareness of how a certain sector is evolving will influence how confidently these particularly long-term projections and related hazards can be applied.