Geophysical Research Abstracts
Vol. 14, EGU2012-4849, 2012
EGU General Assembly 2012

Development of an Environmental Safety Case for a Geological Disposal Facility in the UK

L. Bailey, H. Clark, and M. Wellstead
RWMD-NDA, United Kingdom

Geological disposal is the UK policy for the long-term management of higher activity radioactive waste. The Radioactive Waste Management Directorate (RWMD) of the Nuclear Decommissioning Authority (NDA) has been given the responsibility for implementing geological disposal. The implementation process is founded on the principles of voluntarism and partnership and the UK Government has set in place a process that encourages communities to participate in the siting process. Developing an environmental safety case (ESC) that gives confidence that a geological disposal facility (GDF) for higher activity radioactive wastes will remain passively safe for hundreds of thousands of years after the facility has been closed, and is no longer actively maintained, is an important and challenging part of the programme to implement geological disposal.

Our approach for building confidence in long-term safety is to use multiple barriers to isolate and contain the wastes and to explain our confidence in the performance of these barriers by developing a multi-factor safety case. We will develop a safety case based on varied and different lines of reasoning, including both quantitative aspects and qualitative arguments. We will use a range of safety arguments to support the ESC, drawing on underpinning science and engineering.

We have published a generic ESC (that is not specific to any site or disposal facility design) that considers the long-term safety of illustrative generic disposal facility design examples in stylised geological environments. This generic ESC explains how engineered and natural barriers can work together to isolate and contain the radioactivity in the wastes. The safety arguments in the generic ESC are supported by calculations using a simple model that is illustrative of a broad range of disposal facility designs and geological environments. The generic ESC provides a benchmark enabling us to undertake disposability assessments for waste packages, without foreclosing potentially suitable GDF locations or designs.

As we progress through the site selection process we will prepare an ESC for specific selected site(s) which will be developed in a staged manner, with increasing detail, and be submitted for regulatory approval at key stages in the implementation programme. A site-specific ESC in support of an application for an environmental permit for disposal of radioactive waste at a specific site will be a substantial submission and will need to demonstrate understanding of:

• the geology, hydrogeology, geochemistry, geotechnical characteristics and surface environment of the chosen site and its setting;
• the characteristics of the waste including its radionuclide and materials content, treatment and packaging;
• the design and layout of the disposal facility and the characteristics of the facility when it is closed (i.e. the ‘initial state’ for the post-closure period);
• potential events and processes that may influence the evolution of a GDF;
• the performance of the disposal system and its components in isolating and containing the wastes over very long timescales.

This paper describes the key components of our strategy for the development a site-specific ESC that will demonstrate sufficient understanding and confidence in the performance of a proposed GDF.