



CoRWM Position Paper: Safety Requirements of Geological Disposal

25 October 2018

This Position Paper reflects the Committee on Radioactive Waste Management (CoRWM) current position on safety concerns regarding a Geological Disposal Facility (GDF). This is to respond to Consultation responses such as *'Releases of gasses from a GDF, and how that might react, is an unanswered concern'* and *'Numerous (over 100) technical issues would need to be addressed before a safety case for a GDF could begin to be demonstrated'*. The paper will be updated and revised when more information becomes available.

1. Introduction

Several stakeholder replies to consultation on a UK Geological Disposal Facility (GDF) have raised the prospect of technical aspects of the waste disposal which could lead to failures in safety which could not be addressed. These have been couched in terms such as:

- *'Releases of gasses from a GDF, and how that might react, is an unanswered concern'*,
- *'GDF a 'step into the unknown' – risk of hydrogen / radioactive gasses that would need to be vented'* and
- *'Numerous (over 100) technical issues would need to be addressed before a safety case for a GDF could begin to be demonstrated'*.

Such concerns are, of course justified, and if unanswered, the safety of the GDF could not be assured, the process would fail, and a different solution to the disposition of the UK's radioactive waste would need to be found. However, the experience gained from the work of the GDF developers (Radioactive Waste Management (RWM), originally Nirex), the regulators and CoRWM indicates that a safe GDF should be deliverable. This paper outlines the reasons why.

2. Safety and the GDF Siting Process

The first and firmest attribute of the process to deliver a GDF is that *'if it is not safe it will not be built'*. Safety is ensured by a system of high safety and environmental standards overseen by strong regulators. Without regulatory approval, the construction and operation

of a GDF cannot be delivered. These standards are summarised in Table 5 in Radioactive Waste Management's (RWM) High Level Requirements document.¹

CoRWM's reasons for recommending Geological Disposal as the management option for the UK's Highly Active Wastes are outlined in 'Managing Radioactive Waste Safely: CoRWM's Recommendations to Government' (CoRWM doc 700.).² This report also details why disposal was preferred to indefinite storage.³ To come to this conclusion, it combined a technical assessment of options with ethical considerations, examination of overseas experience, and a wide-ranging programme of engagement both with the public and with interested parties (stakeholders).

The UK regulators including the Office for Nuclear Regulation (ONR), and the environmental regulators; the Environment Agency (EA), Northern Ireland Environment Agency (NIEA), Natural Resource Wales (NRW), require a safety case for the GDF outlining how the facility will protect humans and the environment.

*"A safety case is a logical and hierarchical set of documents that describes risk in terms of hazards presented by the facility, site and the modes of operation, including potential faults and accidents, and those reasonably practicable measures that need to be implemented to prevent or minimise harm. It takes account of experience from the past, is written in the present, and sets expectations and guidance for processes that should operate in the future if the hazards are to be controlled successfully. The safety case clearly sets out the trail from safety claims through arguments to evidence"*⁴

The EA, NRW, and NIEA require an Environmental Safety Case (ESC):⁵

"An environmental safety case is a set of claims concerning the environmental safety of disposals of solid radioactive waste, substantiated by a structured collection of arguments and evidence. It should demonstrate that the health of members of the public and the integrity of the environment are adequately protected."

"The environmental safety case should include quantitative environmental safety assessments for both the period of authorisation and afterwards. These assessments will need to extend into the future until the radiological risks have peaked or until the uncertainties becomes so great that the quantitative assessments cease to be meaningful."

The outcome is that the GDF developer, RWM, must assemble a set of evidence which demonstrates that the GDF will meet safety and environmental standards across a wide range of possible operating and environmental conditions for the GDF. The current embodiment of this safety case is RWM's generic Disposal System Safety Case (gDSSC).⁶

The gDSSC is generic in the sense that no site has been selected. However, the gDSSC examines the safety attributes of potential host rocks together with potential repository designs. The gDSSC sets out all the considerations which will need to be incorporated into the assessment of any particular site. The gDSSC shows the extent to which RWM will need

¹ Geological Disposal Generic Disposal System Specification Part A: High Level Requirements, RWM, December 2016

² Managing Our Radioactive Waste Safely – CoRWM's Recommendations to Government, CoRWM Doc 700, July 2006

³ Reference CoRWM Fact Sheet (in draft)

⁴ Safety Assessment Principles for Nuclear Facilities. Office for Nuclear Regulation, 2014.

⁵ Guidance on Requirements for Authorisation: Geological Disposal Facilities on Land for Solid Radioactive Wastes. The Environment Agency. 2009

⁶ Geological Disposal – Overview of the generic Disposal System Safety Case, RWM, December 2016

to study and model the various possible conditions by which the GDF could fail to protect people and/or the environment. It shows RWM needs to demonstrate, once a site is chosen, that any releases will be well within current health standards. If this demonstration fails, then the GDF would not be licensed or permitted and could not be built.

An additional level of assurance is currently provided by making the Safety Case open to review by interested parties. In particular, via international mechanisms such as the IAEA triennial Review Meetings of the Joint Convention on the Safety of Spent Fuel Management and on Safety of Radioactive Waste.

3. Technical and Relevant CoRWM Work

During CoRWM's assessment of possible radioactive waste treatment routes, technical information was provided by various organisations on the sort of issues raised by stakeholders and mentioned in the introduction to this paper. CoRWM has followed the development of RWMs gDSSC⁷ and noted its progress alongside the safety cases of other nations progressing radwaste disposal.

In the course of its work Nirex/RWM have maintained an 'Issues Register' that catalogues outstanding technical issues postulated by stakeholders, and Nirex/RWM have addressed many of these issues. For example, gas generation was studied by Nirex, who used sophisticated models to predict the amount of gas generated and transported from the GDF, which CoRWM subsequently reported.⁸ A substantial amount of material has also been published by the British Geological Survey.⁹ This potential problem is specifically recognised in the December 2016 gDSSC, which states that "*The disposal system shall ensure that any gas generated in the facility will not compromise safety*".

4. CoRWM Current Stance

The number of technical issues that have been raised and which must be satisfied before a GDF could be licensed is very considerable, and the technically credible issues raised by stakeholders will either have been raised within the gDSSC or will be in future. CoRWM's view is that any aspects which make the GDF unsafe, would be picked up by the regulators who would not license the facility or allow it to be constructed until these matters were resolved. One of CoRWM's ongoing roles will be to ensure that such concerns are 'mapped' into the GDF safety assessment and safety case and successfully resolved by RWM.

⁷ See, for example, CoRWM's assessment of the generic Disposal System Safety Case (gDSSC) published by the Radioactive Waste Management, CoRWM Doc 2994, March 2012

⁸ Summary for CoRWM on Gas Breakthrough Time Issues, CoRWM Doc 1976, January 2006

⁹ See <https://www.bgs.ac.uk/forge/>