**Integration Group for the Safety Case (IGSC) Symposium 2024***MOVING TOWARDS THE CONSTRUCTION OF A SAFE DGR – GETTING REAL*

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| **Abstract Title:**  **Scenario Development: A systematic approach to scenario development and assessment [Proposed for a poster presentation]** | |
| **Abstract (300-500 words):**  The United Kingdom is committed to the safe management and disposal of higher activity radioactive waste through a policy of secure interim storage prior to final disposal in a deep geological disposal facility (GDF). The UK’s approach to finding a suitable site for a GDF is laid out in the “Implementing geological disposal – working with communities: long term management of higher activity radioactive waste” policy. As part of this policy a suitable location for a GDF will be identified through a consent-based process with the UK Government and its agencies working in partnership with communities. Nuclear Waste Services (NWS), formerly RWM, is the delivery organisation responsible for the implementation of a safe, sustainable and publicly acceptable programme for geological disposal.  System evolution scenarios are central to the development of a safety case for a GDF. In the NWS approach, scenarios are grouped into three categories which impact the safety case in different ways. The first is the expected or normal evolution scenario(s) in which the safety functions operate as designed. It may be that there are very limited releases in these scenario(s) and their performance will lie well within regulatory dose or risk guidelines. The second are variant scenarios which may disrupt the expected evolution, which are less likely to occur but are still credible and hence need to be considered as possible within the safety case. A GDF safety case would need to be robust to such scenarios and therefore these scenarios are used for GDF design optimisation. In the UK, we refer to the first and second group of scenarios collectively as the ‘base scenario’. In our performance assessment we aim to demonstrate that we have adopted a broad-brush base scenario that is consistent with our regulatory risk guidance level. As we do not apply any probability weighting to events within the base scenario set (in effect the weighting factor is one for this scenario set), in our performance assessment we can subsume all scenarios that would give a lower consequence than the base scenario into the base scenario when assessing the radiological risk from the GDF.  The third are ‘what-if’ scenarios, designed to test the limits of the safety functions in hypothetical situations. Such scenarios may be implausible (for example complete failure of a safety barrier) and therefore the safety case does not necessarily need to be robust to ‘what-if’ scenarios, rather they are used to explore the limits of robustness.  In 2016, NWS developed its generic disposal system safety case (gDSSC), which presented base scenarios for illustrative environments relevant to the UK. NWS is now undertaking site selection work and is building on the gDSSC to develop a set of scenarios that relate to the environments currently being evaluated, namely lower strength sedimentary rock (LSSR) sites. This work has been performed with the goal of increasing the understanding of scenarios which may be disruptive to the base case and to which a UK design and safety case programme would need to demonstrate robustness. These scenarios are then used to provide guidance on research and development priorities and to inform the design optimisation process.  These scenarios have been developed based on consideration of the system safety functions and the features, events, and processes (FEPs) that may perturb them. This methodology emphasises a clear definition of disposal system safety functions combined with safety function specific screening of FEP lists to elicit potentially disruptive variant scenarios. This methodology will be outlined along with the set of scenarios elicited. Preliminary assessments of these identified scenarios have been undertaken using simple, generic models where possible. | |

1. NWS – Nuclear Waste Services [↑](#footnote-ref-2)
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