

NATURAL SYSTEM EVIDENCE UNDERPINNING THE NUMO 2015 SAFETY CASE

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Whilst there has been to date no choice of host rock or site, NUMO has now been developing a generic safety case (the NUMO 2015 Safety Case) to demonstrate the technical feasibility and long-term safety of geological disposal in Japan. A particular concern has focussed on the long-term geosphere stability owing to the frequent occurrence of a wide spectrum of natural events/processes, such as igneous activity, occurrence of non-volcanic thermal or deep-seated fluids, fault movement and uplift/erosion, in relation to tectonic evolution over geological timescales.

One of the top-level statements is thus defined as “selecting a suitable repository site in Japan where the favourable thermal, hydrological, mechanical and chemical (THMC) conditions will persist in the host rock environment for a long period of time would be feasible”. This key statement is underpinned by the multiple lines of arguments and evidence that potentially significant impacts of natural disruptive events/processes on the geosphere can be precluded and then the temporal and spatial (or 4D) evolution of the host rock environment can be characterised with considering gradual natural processes that develop rather slowly with time over a large spatial scale.

The natural system evidence that is highlighted in NUMO’s latest geoscientific knowledge base contributes to developing such arguments and evidence, in a reasonable fashion, for the reliance that can be place on the long-term geosphere stability in Japan. A couple of examples in the NUMO 2015 Safety Case will be presented, with the main focus both on demonstrating the persistence of favourable THMC conditions in deep geological environments and also on redefining criteria and methodologies for precluding potentially significant impacts of natural disruptive events and processes on the favourable subsurface environments.

In addition, the rational use of natural system evidence in the site investigation programme will be discussed from the ‘analogue’ point of view. Of great importance is to use ‘regional scale analogues’ – information from similar rock types in similar geological settings to the potential areas – to complement site-specific information for eventually evaluating ‘site stability’. This should be one of key arguments for developing an optimised site investigation programme in the NUMO 2015 Safety Case.