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Basis for a research project on marking strategies for a deep geological high-level radioactive waste (HLW) repository in Germany

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Abstract. Marking has been considered as an approach for the preservation of information and awareness after the closure of a deep geological repository (DGR) for high-level radioactive waste (HLW). The discussion to use markers to warn people off from – in oversimplified terms – digging into a DGR dates back to the 1980s. Based on the recent recommendations by the Nuclear Energy Agency of the Organization for Economic Co-operation and Development (OECD NEA) regarding the preservation of records, knowledge and memory (RK&M) of DGRs in a systemic approach (NEA, 2019), the Federal Office for the Safety of Nuclear Waste Management (BASE) has identified the need for research regarding relevant aspects of potential future marking strategies in Germany.

The first elaborate and sophisticated concept has been developed for the Waste Isolation Pilot Plant (WIPP) in the USA (DOE, 2004). Far from being "one marker", it is a monumental multi-component system. Internationally, the WIPP concept provided abundant food for thought and inspired a new wave of discussions – not as a design to be copied to other DGRs (the WIPP concept has been developed for this specific DGR at its unique desert location), but as a model for site-specific ambitions to design a marker system that aims in earnest to preserve information and awareness on-site by non-mediated means.

In NEA (2019) marking is described as one approach – out of nine – for the preservation of RK&M of DGRs. Marking was found to be focused, in particular, on preserving awareness. However, for a robust system, individual preservation mechanisms should not be planned in isolation, but rather "the components of a systemic RK&M preservation strategy should work together, complement and strengthen each other, act as indexes to each other and thus provide diversity and redundancy with a view to maximising information accessibility, understandability and survivability over the various timescales considered" (NEA, 2019, p. 95).

In Germany, there are no regulatory requirements with regards to marking. The Site Selection Act (StandAG, 2017/2023), which sets the regulatory framework for the targeted DGR for HLW, does not mention marking. It mentions, however, two points with specific relevance to RK&M preservation: (1) important data and documents must be permanently stored, and (2) the DGR concept must ensure recoverability of the waste for 500 years after closure, thereby setting a post-closure time frame of specific interest.

Against this background, a research project is planned to explore the relevant aspects of potential future marking strategies in Germany. Different types of markers may play different roles. And these roles may again change over time: what are the specifics imposed by the 500-year recoverability requirement? How could surface markers be combined with, e.g., concepts for the re-use of the site or possible added-value projects for the local community? Could off-site markers/monuments play a role? Who would be the stakeholders in a participatory process? With respect to deep geological markers, different questions arise, like the following: could markers within the DGR potentially play a role in recoverability concepts without negatively impacting long-term safety? What dependencies exist on the type of host rock yet to be selected? Could the same markers help warn an inadvertent intruder in the long term? The potential role of markers in a systemic RK&M preservation strategy

needs to be investigated by taking other preservation approaches into consideration, too. Which mechanisms could strengthen the efficacy of markers? Which could be strengthened by markers?

This presentation will deliver insight into the preliminary studies preceding the planned research project.

References

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