

Towards best possible safety - Current regulatory research for the German site selection process for high-level radioactive waste disposal

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The German Site Selection Act (Standortauswahlgesetz – StandAG) defines the search for and selection of the national German site with best possible safety for a disposal facility for high-level radioactive waste. The Federal Office for the Safety of Nuclear Waste Management (BASE) is the federal regulatory authority for radioactive waste disposal. BASE supervises the site selection process for a repository for high-level radioactive waste and is responsible for the accompanying public participation. To fulfill its tasks according to the state of science and technology, task related research forms an integral part of BASEs activities. Current research activities in the context of the site selection process address geoscientific questions, methodological aspects of the implementation of the site selection process, and public participation aspects. This contribution provides an overview on the current geoscientific and methodological research activities of BASE.

According to § 16 StandAG , the national implementer (Bundesgesellschaft für Endlagerung mbH) has to execute surface-based exploration and BASE has to review and define the respective exploration program. Therefore, the two projects *MessEr* and *übErStand* compiled state of science and technology with regard to surface based exploration methods. The foci were on methods suitable for addressing the criteria and requirements set out in the German Site Selection Act.

The project *KaStör* reviewed the current knowledge on active faults and fault zones in Germany and studied methodological approaches to date and identify the activity of faulting. The results support BASE to review the application of the exclusion criteria for areas with “active faults zones” according to § 22 (2) StandAG.

For the time being, § 27 (4) StandAG defines 100 °C as precautionary maximum temperature at the outer surface of waste canisters for all host rocks. The project *Grenztemperatur* compiled and studied the temperature dependency of the different THMC/B processes according to available FEP catalogues for rock salt, clay stone, and crystalline rock. The project also identified open and pending research questions and describes ways to define host rock specific maximum temperatures based on specific disposal and safety concepts.

During the site selection process, safety oriented weighting of different criteria and comparison of different potential regions and sites have to be performed. The project *MaBeSt* studied and reviewed methodological approaches to this weighting and comparison problem with special emphasis on multi criteria analysis (MCA) and multi criteria decision analysis (MCDA).

Key requirement for safe geological disposal of nuclear waste is barrier integrity. The project *PeTroS* experimentally studied potential percolation mechanisms of fluids within rock salt at isotropic conditions at disposal relevant pressures and temperatures.