TOPIC DESCRIPTIONS

Overview

#	Short title	Topic name
1	Repository projects	Repository projects and programmes, including RD&D programmes for clay-based disposal systems worldwide
2	Geo/Hydro/Geochem	Geology, Hydrogeology and Hydrogeochemistry
3	Flow/Migration	Fluid flow and solute/radionuclide migration
4	THMC host rock	THMC-coupled processes in clay host rock (with a certain focus on temperature-induced effects)
5	THMC bentonites	THMC-coupled processes of bentonite barrier material (with a certain focus on temperature-induced effects)
6	HM/gas EDZ	Hydro-mechanical and gas transport processes during the excavation, operational and post-closure phases
7	Chem./Min./Microbio.	Chemical and mineralogical alteration processes and microbiological processes
8	Technology	Technological operations, performance assessment and optimization of components
9	Monitoring	Monitoring (from initial state to post-closure period and from sensors to data management)
10	AI/Digitalisation	Artificial Intelligence apps, digitalisation and Digital Twins applicable to or motivated by radwaste disposal

Topic 1: Repository projects and programmes, including RD&D programmes for clay-based disposal systems worldwide

RD&D programmes (national or international) on the implementation of repositories in clay formations and development of engineered clay barriers for radioactive waste confinement, including disposal design and safety assessment, lessons learned (state of scientific and technological knowledge) and priorities in RD&D in line with disposal development (including the role of underground research labs and pilot industrial phase).

Topic 2: Geology, Hydrogeology and Hydrogeochemistry

Site characterisation (boreholes, seismic, geophysics, URLs), sedimentology, diagenesis, dating techniques, discontinuities in clay rocks, mineralogy, porosity, from nanoscale (microscale) to macroscale characterization of clay rocks and clay-based materials, large-scale 3D distribution/modelling of clay rock properties, Hydrogeology modelling (from initial state to long term), solid-fluid equilibrium, pore-water chemistry, isotope geochemistry, geochemical modelling including thermodynamics data, organic matter.

Topic 3: Fluid flow and solute/radionuclide migration

Water, solute & gas transport processes (advection/dispersion, diffusion, sorption, coupled processes), fully and partially saturated conditions, colloid-mediated transport, aqueous speciation, solubility, redox, interactions with clay minerals and organics, influence of chemical processes and coupled Thermal-Hydro-Mechanical-Chemical processes on radionuclides migration, modelling and up-scaling (nanoscale to macroscale – large scale), in-situ experiments, mock-up, analogues.

Topic 4: Thermal-Hydraulic-Mechanical and -Chemical coupled processes of clay host rock (with a certain focus on temperature-induced effects)

Hydro-mechanical properties of clay rocks, laboratory testing, long-term behaviour, damage/plasticity/time-dependent processes, large-scale (host rock) geo-mechanical behaviour/processes in geological context, constitutive models. Thermally induced overpressure and damage, stress/strain/pressure paths due to thermal loading, including large-scale demonstration experiments, modelling and upscaling.

Topic 5: Thermal-Hydraulic-Mechanical and -Chemical coupled processes of bentonite barrier material (with a certain focus on temperature-induced effects)

Hydro-mechanical properties of bentonite barrier material, laboratory testing, long-term behaviour, damage/plasticity/time-dependent processes, mineralogical changes, geo-mechanical behaviour/processes in geotechnical context, constitutive models. Thermally induced overpressure and damage, stress/strain/pressure paths due to thermal loading, including large-scale demonstration experiments, modelling and upscaling.

Topic 6: Hydro-mechanical and gas transport processes in the EDZ/EdZ

EDZ/EdZ (Excavation Damaged/disturbed Zone) characterisation and evolution over time, constitutive models (fractured medium to equivalent porous medium), self-sealing, relationship with excavation and support methods, effect of ventilation, interactions between clay host rocks and disposal components (clay-based seals and backfills) and between disposal components over time, gas transport in the EDZ/EdZ clay-based engineered barriers and at interfaces, including large-scale demonstration experiments and modelling.

Topic 7: Chemical and mineralogical alteration processes and microbiological processes

Gas interactions, hydration-dehydration and swelling processes, alkaline perturbations, saline and organic plumes, iron-clay interactions, microbiological processes, fully and partially saturated conditions, including large-scale demonstration experiments, modelling and up-scaling.

Topic 8: Technological operations, performance assessment and optimization of components

Methods and materials for excavation, support, sealing and backfilling, assessment of long-term performance, including large-scale demonstration experiments and modelling.

Topic 9: Monitoring (from initial state to post-closure period and from sensors to data management)

Monitoring strategy, monitoring concepts and monitoring of the evolution of disposal systems, RD&D on sensors for relevant processes, data mining/management, expert systems.

Topic 10: Artificial Intelligence apps, digitalisation and Digital Twins applicable to or motivated by radwaste disposal in clay based concepts

High-performance data analytics and Artificial Intelligence, 3D Modelling, Digital Twins and BIM (Building Information Modelling) in geosciences within the field of radioactive waste geological disposal, GeoModeller, high-performance computing.