RADIONUCLIDE MOBILITY UNDER PERTURBED CONDITIONS (RAMPEC) – WP12

Wednesday 10th October • M. Altmaier, (KIT)

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Improve the predictive capacity *of models*

of ***disposal system chemistry*** *and* ***radionuclide mobility***

under ***perturbed conditions***

based on a combination of ***new experimental and modelling studies***

up to the ***cell scale***

OVERALL RATIONALE

- Good understanding of radionuclide (RN) behaviour in argillaceous, crystalline and cementitious systems under equilibrium conditions has been derived from past experimental studies in simplified reference systems.
- Radionuclide and gas behaviour under perturbed conditions, however, are poorly constrained and up to date there is no integral (deterministic predictive reactive transport) model based description for perturbed systems, especially regarding the capability of describing the chemical evolution of *in-situ* conditions.
- RAMPEC will provide improved methods and approaches both regarding mechanistic modelling of radionuclide retention and migration on the disposal cell scale (meter to decametre scale).
- Use of existing data from previous projects (FUTURE, CORI, …) and targeted new experimental investigations performed in RAMPEC.
- Restriction three systems (Clay, Granite, Cement) with a limited number of specific perturbations.

RAMPEC TASKS AND BOARD

	Task title	Task leaders	
		Main Task leader	Co Leader if applicable
1	Management/coordination of the WP	**Marcus Altmaier**, [KIT], RE, DE	Jean-Charles **Robinet**, [ANDRA], WMO, FR
2	Knowledge Management	**Tiziana Missana**, [CIEMAT], TSO, ES	
3	RAMPEC experimental program	**Norbert Maes**, [SCK-CEN], RE, BE	*Subtask-Leaders:* **Norbert Maes**, [SCK-CEN], RE, BE **Susan Britz**, [GRS], TSO, DE **Nathalie Macé**, [CEA], RE, FR
4	Development of macroscopic/mechanistic models	**John Provis**, [PSI], RE, CH	**Johannes Meeussen**, [NRG], TSO, NL
5	Upscaling of data and models - benchmarking	**Jean-Charles Robinet**, [ANDRA], WMO, FR	**Andres Idiart**, [AMPHOS21], RE, ES

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TECHNICAL TASKS IN RAMPEC – OVERVIEW

- Proof of concept for the creation of a substantiated Retention/Transport Parameters (RTP) database.
- Experimental activities to improve the knowledge of radionuclide transport behavior in the presence of different (combined) perturbations specific to each analyzed system.
  - Clay *(radionuclide transport behavior for the perturbations: temperature, partial desaturation, chemical perturbations: alkaline plume / ionic strength / small organic molecules.*
  - Cementitious materials *(effect of ionic strength perturbations, limited to sulphate and nitrate, and the impact of the saturation degree on radionuclide migration through cement-based materials)*
  - Crystalline rock *(reactive transport of safety-critical elements/RNs in different crystalline rocks. => RNs and secondary phases, changes in pore-water composition, and pore structure).*
- Development and use of combined deterministic models to describe chemical evolution, radionuclide behavior and migration in perturbed systems.
- Improved ability of models to represent perturbations and the effects on radionuclides at the disposal cell scale (meter to decameter scale) in support of Performance and Safety Assessment calculations.

Thank your for your attention !

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