FISA EURADWASTE 2025

SNETP Forum

ANCHORS -HYDRAULIC MECHANICAL CHEMICAL EVOLUTION OF BENTONITE FOR BARRIERS OPTIMISATION

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1. Introduction:

The knowledge of long-term Thermo-Hydro-Mechanical Chemical (THMC) behavior of bentonite-based components contributes, as a main factor, to the safety improvement and optimisation of Engineered Barrier Systems (EBS) for all Deep Geological Repository (DGR) concepts. Whereas several bentonites are well studied, a rising number of alternative bentonites and mixtures are under consideration across Europe that are not well investigated yet. Potential disruptions to the global bentonite supply chain could severely restrict the supply of the well-studied bentonite. To mitigate this problem, a wide range of alternative bentonites that can be used to seal a DGR without compromising its safety need to be characterized. Within the EURAD2 European partnership on Radioactive Waste Management, the ANCHORS Work Package (WP) has been designed to address these challenges.

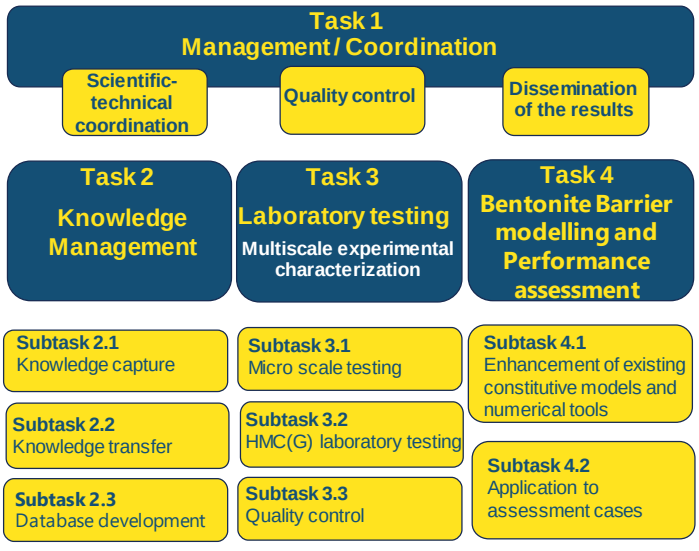
2. ANCHORS Objectives:

ANCHORS' main objective is to increase the optimisation potential of bentonite barrier systems and the robustness of the safety case:

1) by qualifying the Hydro Mechanical (HM) behavior of various kind of bentonite types and mixtures through laboratory experimental program focused on heterogeneity, chemical effects and friction at different scales.

2) by improving the numerical tools that are necessary to carry out performance assessment of bentonite barriers in a THMC(G) repository environment.

3. ANCHORS Task breakdown:



4. ANCHORS Methodology:

5. ANCHORS Impact:

- Qualification of multiple bentonite types and mixtures as alternative sealing materials in different repository concepts.
- Investigation of chemical effects (e.g., alkaline and saline conditions) on the HM behavior of bentonite and bentonite-based mixtures and how it affects the disposal performance.
- Study of the consequence of bentonite and bentonite mixtures heterogeneities in long term sealing performance.
- Improvement of THMCG constitutive models related to the micro/macro interactions of the bentonite structure and the heterogeneity.
- Establishment of a comprehensive database containing THMCG material properties for various kinds of bentonites and bentonite mixtures.
- Elaboration of recommendations for better quality control of bentonite.

6. Acknowledgments

ANCHORS WP is part of the European Partnership on Radioactive Waste Management 2 (EURAD-2). EURAD-2 is co-funded by the European Union under Grant Agreement N° 101166718.