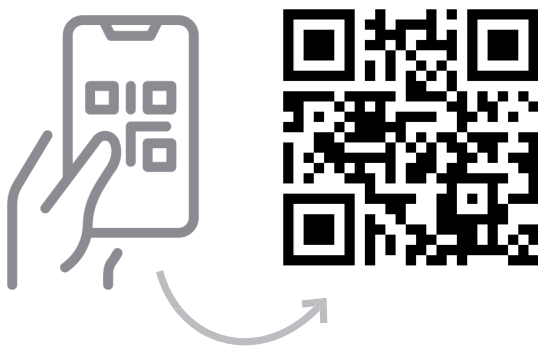


Integrated Experimental Programme for Evaluating the Technical Feasibility and Long-Term Performance of the Engineered Barrier Systems planned in the Czech Deep Geological Repository Concept

Scan the QR code for more information about SÚRAO:

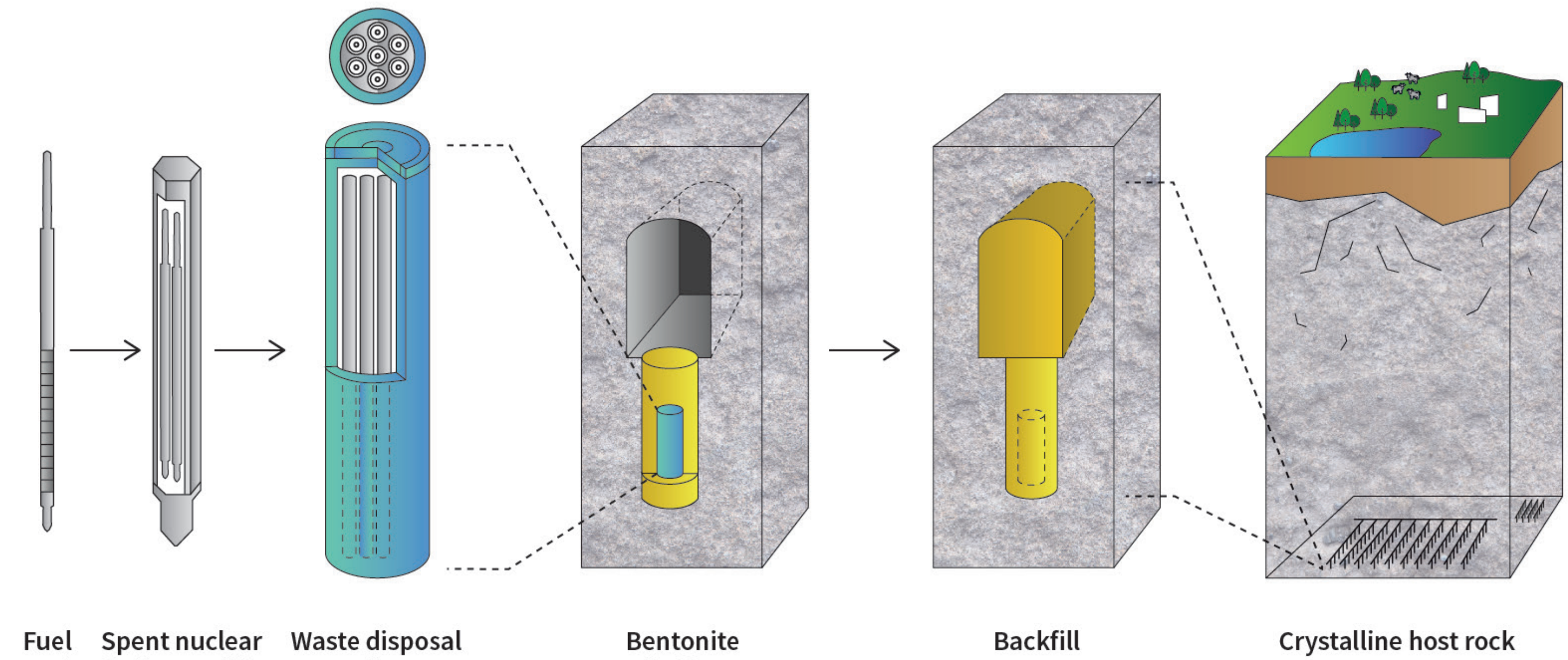


SÚRAO is implementing its RD&D plan via a structured programme of in-situ experiments conducted at the Czech Bukov and Josef generic underground research facilities (URF). These activities are being complemented by laboratory research conducted by long-standing SÚRAO suppliers including various Czech research institutions and universities. SÚRAO is also involved in a range of international projects underway at the Grimsel Test Site (e.g. the HotBENT project) and is contributing to several work packages as part of the EURAD-2 programme (e.g. the RAMPEC and ANCHORS WPs).

The experimental programme coordinated by SÚRAO's department 4100 focuses on the technical feasibility and long-term performance of engineered barrier systems (EBS), particularly the bentonite-based components (buffer and backfill) and metal waste disposal packages (WDP). Key ongoing activities include the operation and dismantling of the **Interaction Experiment** at the Bukov URF, which is providing long-term data on bentonite-concrete interactions under repository-relevant conditions. Corrosion experiments, including the **Pilot corrosion experiment** underway at the Bukov URF and experiments conducted as part of the InCoManD EURAD-2 WP, are investigating the degradation behaviour of metal components in bentonite environments. These studies are essential in terms of demonstrating the integrity of waste disposal packages over the repository lifetime. The dismantling of the **EPSP experiment** (an in-situ model of a deep geological repository pressure and sealing plug) in the Josef underground laboratory is in the planning stage. Planned participation in the "RELABEN" project will further enhance both the exchange of knowledge and benchmarking.

Key features of the Czech EBS

- **Buffer and Backfill:** Use of Czech Ca-Mg bentonite, bentonite blocks + a granular bentonite mixture for the buffer and a granular bentonite mixture for the backfill.
- **Waste Disposal Package:** Two-layer design that combines inner stainless-steel casings (AISI 316L / EN 1.4404) and an outer carbon steel casing (S355J2H+N).
- **Development of low-pH Concrete:** Ongoing research into and the testing of low-pH concrete formulations aimed at minimising alkaline disturbance and maintaining the performance of the bentonite over long-term disposal periods.

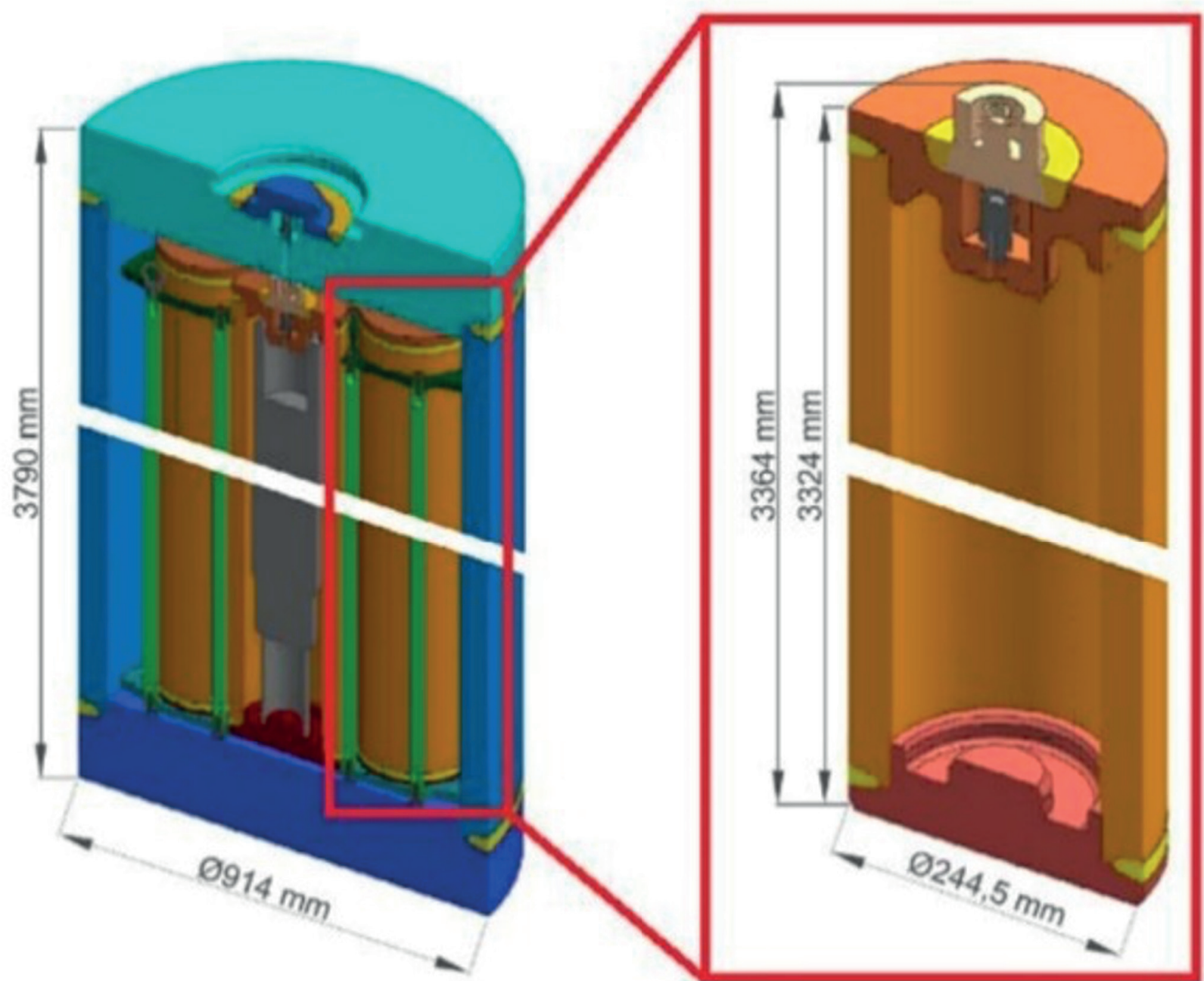


↑ Currently considered technical solution for the disposal of waste disposal packages with spent nuclear fuel in the Czech deep geological repository (DGR)

The Czech DGR technical design:



SÚRAO RD&D plan:

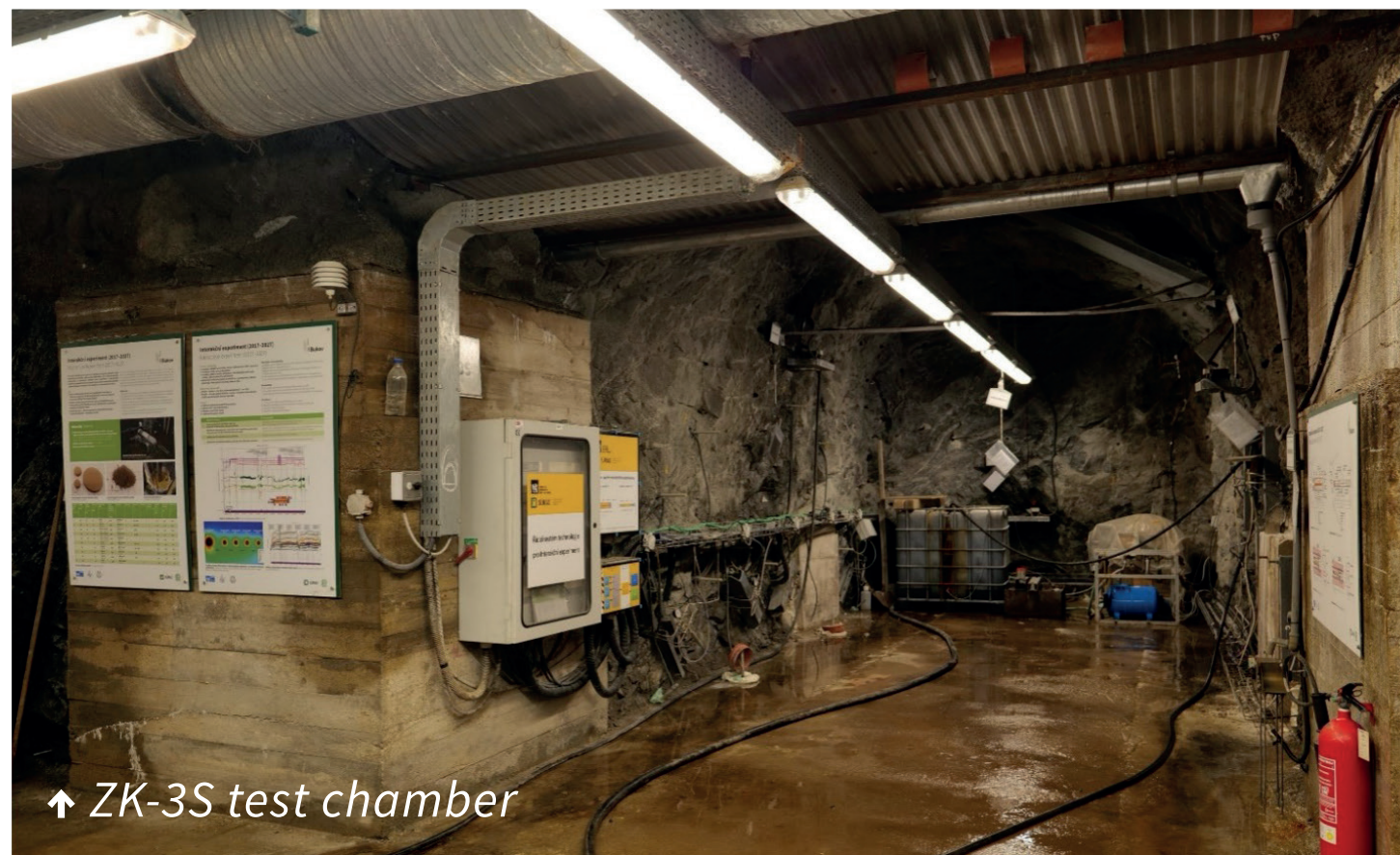


↑ Sample of WDP ŠKODA 440/7



Key in-situ experiments at the Bukov URF

- **Interaction Experiment (2017–2027):** Focusing on the study of chemical and physical interactions between bentonite, cement materials and groundwater under repository-relevant conditions.
- **Pilot Corrosion Experiment (2021–2034):** Long-term assessment of the corrosion behaviour of waste disposal package candidate materials in DGR environments.



↑ ZK-3S test chamber



↑ Installation of physical models (2019)



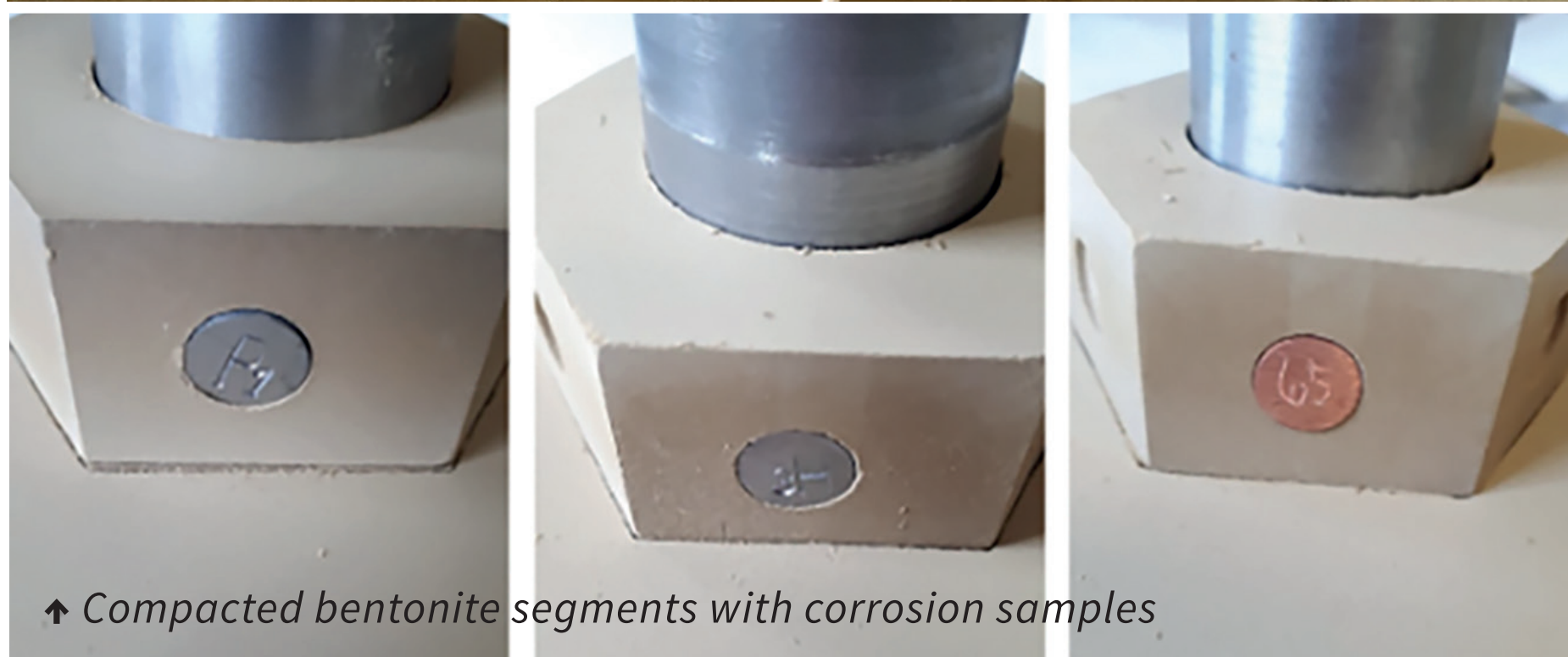
↑ Dismantling – First phase (2025)



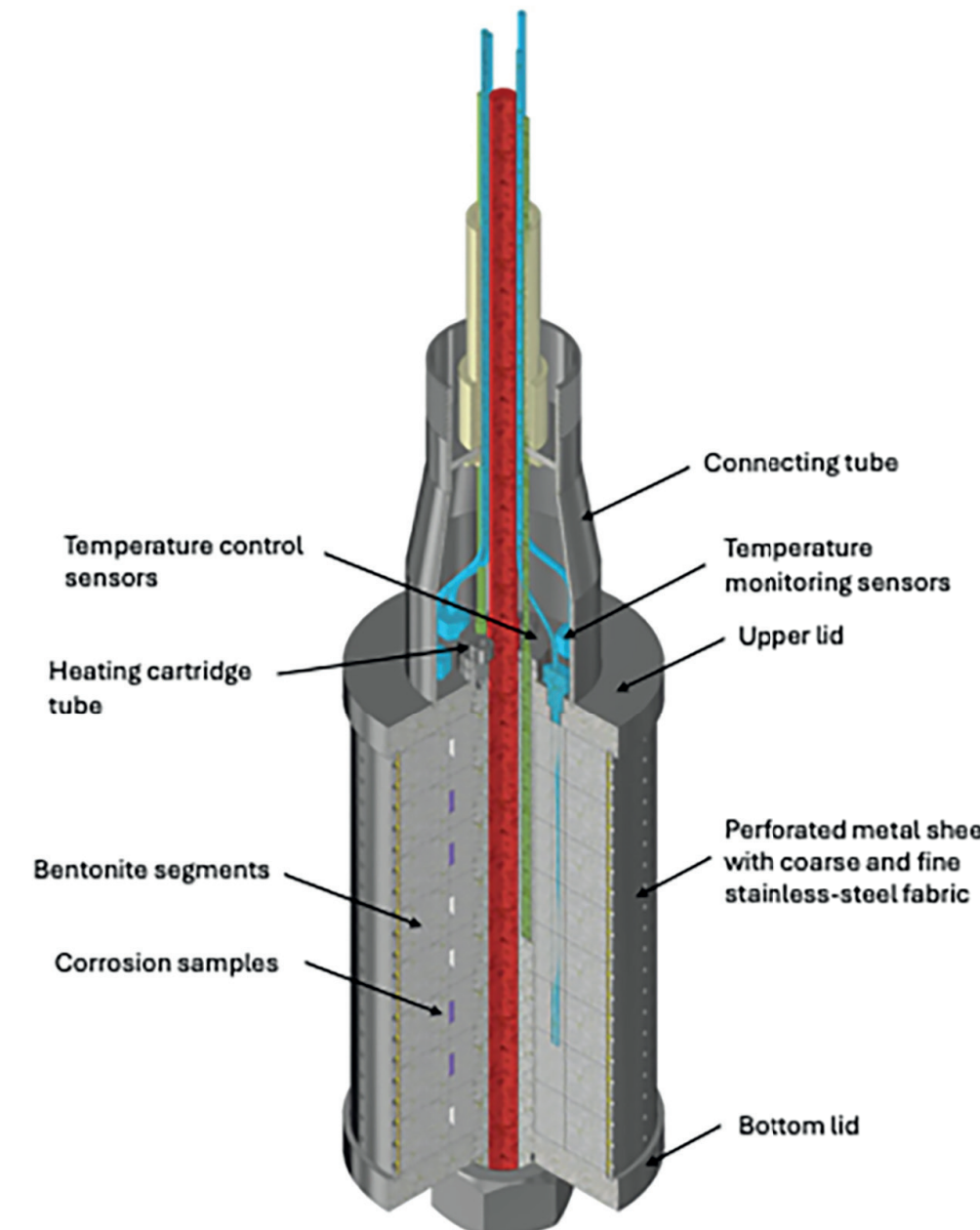
↑ Sectioning and sampling (2025)



↑ ZK-3J test chamber



↑ Compacted bentonite segments with corrosion samples



↑ Corrosion module



↑ Installation of corrosion modules (2023)

Important in-situ experiments at other generic URFs

- **MOCK-UP Josef (Josef Underground Laboratory, 2011–2024):** An in-situ physical model of the vertical disposal concept at a scale of approximately 1:2.
- **DOPAS EPSP (Josef Underground Laboratory, 2012–2029):** An in-situ model of a disposal tunnel plug in a DGR. The dismantling project is scheduled to begin in 2026.
- **HotBENT (Grimsel Test Site, 2019– ?):** A full-scale in-situ experiment based on the Swiss concept of the horizontal disposal of containers in the DGR. One section of the experiment includes components made from Czech BCV bentonite.

Dismantling of the Mock-up Josef in-situ experiment – final report:



DOPAS EPSP report:



HotBENT project website:

