Introduction

The SÚRAO generic research programme is focused on the detailed testing of the crystalline rock concept. Generic laboratories serve as training centres for staff members, experimentation involving mock-up experiments and the development of methodologies for the study of rock conditions in underground environments. One of the most important aspects of generic research consists of the testing of the validity of data collected from the earth’s surface and the approximation of such data to depths at which the construction of the repository is envisaged. SÚRAO has close connections with three underground research centres in the Czech Republic: the Josef Gallery, the Bedřichov Water Supply Tunnel and the Bukov Underground Research Facility (Bukov URF). The Bukov underground generic laboratory is located in the eastern part of the Czech Republic near the Kraví hora candidate repository site and adjacent to the Rožná uranium mine at a depth of 600m below the earth’s surface. From the geological point of view the facility is located in the north-eastern part of the Moldanubian Zone of the Variscan orogen and is composed of migmatitised paragneisses with amphibolite layers. The felsic granulites display the same deformational history as that of the nearby Kraví hora candidate locality.

Characterization

The scientific programme conducted during the construction of the facility concentrated on the characterization of the site from the geological, geomechanical and hydrogeological points of view. The characterization programme will include the following research areas:

- Complex geological characterization
- Geotechnical characterization
- Hydrogeological properties of the rock mass

An understanding of the behaviour of water within the repository system is crucial in terms of safety case considerations. Hydrogeological studies therefore include the monitoring of water influx and the evolution of the chemical and physical properties of water collected from the surrounding rock. Borehole hydrogeological tests, tracer tests and water pressure tests will be conducted during the experimental phase.

Hydrogeological properties of the rock mass

The application of a range of geological methods will be aimed at obtaining a multidisciplinary description of the host rock in order to assist in determining the optimum location for the performance of the experimental programme. Geological characterization will comprise geological and structural mapping and the deciphering of the temporal, spatial and thermal evolution of the ductile and brittle pattern.

Experimental programme

The underground research facility research and experimental (R&E) programme will be conducted in very similar conditions to those expected at the location of the future deep geological repository. The Bukov URF will serve as a test site for assessing the behaviour of the rocks at the candidate sites at a depth matching the expected depth of the deep geological repository until the final site is selected and the confirmation underground laboratory is built at that site.

The experimental programme consists of 7 basic areas:

- R&E Programme 1: Pilot characterization of the rocks in order to test the methodology for setting up 3D Geo / GT / HG models of the site
- R&E Programme 2: Testing of long-term monitoring methods for processes occurring at repository depth
- R&E Programme 3: Testing of groundwater flow / radionuclide transport models of the fracture environment of the DGR
- R&E Programme 4: Testing of the effect of the rock at repository depth on the properties of the engineered barriers
- R&E Programme 5: Testing of the development of excavation disturbed/damaged zones in crystalline complex rocks at repository depth
- R&E Programme 6: Investigation of the effect of the rock massif on the