

Hydrogeology questions

The visit to Forsmark is mainly for understanding better the site itself, i.e., topography, surface environment, large fracture system, outcrop observation, drill cores, etc. as well as the site characterization programme.

The IRT are also interested in the

- Hydraulic properties of fractures and fracture systems under the boundary conditions of today and in the future.
- Future changes of these hydraulic fracture properties (and related groundwater flow) in response to changes in /mechanical/ boundary conditions (i.e. stresses, strains)
- inflow predictions, data supporting transmissivity of reactivated fractures
- selection of excavation method (drill and blast, TBM excavation...) and the underground site characterization program.

A few more specific questions are as follows

- Coupled deformations: As a result of repository excavation, a hydraulic sink (with flow towards the excavations), changes in hydraulic head fields and a reduction in pore pressure at the kilometre scale around the excavations will be created. This can cause significant surface deformations, shearing of pre-existing large scale fractures and seismic activity – even in case of small inflows and negligible water table drawdown. The surface deformation values described in the SKB answer to question 2.3.1 at the NPP Forsmark are rather low. We would like to discuss these mechanisms and how they have been treated in the reference evolution of the repository in greater detail.
- Can SKB present further a practical way to map fractures with several meters to several tens of meters scale, which will be important for hydrogeological DFN, in detail, and show how these data are used to reduce the uncertainties in hydrogeological DFN model ?
- It is necessary to develop models which relate the transmissivity and fracture size, and to conduct calibration to find appropriate model. At present, three-correlation models, i.e., correlated, semi-correlated, and uncorrelated, are considered and these three models are used as variants for safety evaluation. Thus, the uncertainties of these correlation models penetrate into the uncertainties of the analyzed results of the whole system. Once the construction of the underground

facilities starts and data gathering, especially on the hydraulic properties and geological mapping, is conducted, more detailed evaluation on the appropriateness of the correlation models and more proper set up of the fracture properties can be done. Again, it is desirable if SKB can present details how to achieve these objectives during the construction phase.

How can it be arranged that these issues are covered between the Forsmark and the Stockholm visit? Does an intensive session on fracture questions between SKB specialists and some IRT members need to be arranged? This general topic is also on the agenda for Monday afternoon.