Synthesizing geoscientific data into a site model on a long-term evolution of the geological environments, Horonobe URL, Hokkaido

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A critical issue for confidence building in the safety case of a geological disposal system is to provide a set of arguments and analyses to demonstrate the stability of the geological environments, taking into account its future evolution. In particular for the Japanese disposal program, arguments on the potential impact of natural events and processes on such long-term stability are a key to assure long-term repository safety. A prerequisite for establishing such arguments is a transparent and traceable methodology for planning field investigations on the basis of mapping available investigation techniques onto the data to be acquired, interpretation of this data, and the synthesis and integration of the results of disparate investigations and analyses into a consistent site model which incorporates long-term evolution of the local geological environment.

This study presents an application of a combined method based on the Data Flow Diagram (a Geosynthesis methodology developed in previous site-investigation programs, for example the NAGRA Wellenberg project in Switzerland) and the Process Diagrams (or Interaction Matrix; developed in the SKB Safety Report 97) for a sequence of field investigation and analysis activities. It focuses, in particular, on the long-term evolution of groundwater flow conditions and the spatial distribution for salt concentrations in the groundwater of the Horonobe area, Hokkaido, northern Japan. This takes account of the impacts of external events and processes, such as uplift, subsidence, denudation, sedimentation, and changes of sea-level and climate.

Utilising this approach, the results of field investigations can be integrated to evaluate the temporal variation of hydrogeological model with associated changes in boundary conditions, such as a groundwater recharge volume and total hydraulic head as a result of climatic and topographic changes from the past to the present.