

Significance of the Hydrogeological Compartment Structure in the Geological Disposal Program

TAKEUCHI, Shinji^{1*} ; KIJIMA, Mifumi¹

¹Nihon University

As lots of major faults of low permeable fault core with higher permeable damaged zone on both side of the fault core have been reported in Japan, the fault compartment could generally exist. The existence of the fault core and damage zone could result in permeability contrasts between perpendicular and parallel to the fault zone.

In hydrogeological characterization of a potential disposal site, one of the specific concerns is to understand what happens if an underground facility is constructed in the fault compartment bounded by low permeable faults (hydrogeological compartment structure (HGCS)) within a fractured rock. Groundwater cannot easily flow into such HGCS from its surroundings, causing a huge drawdown in the HGCS. Hydraulic gradient and flow velocity would be lower value in the HGCS.

The existence of HGCS at a regional scale has also been suggested around the Mizunami area. Changes in static pressure heads and pressures in response to earthquake and cross-hole pumping test have been observed within a larger block bounded by the faults and/or lineaments.

If the HGCS could widely be distributed in Japan, site suitability of the HGCS for a high-level radioactive wastes (HLW) repository should be evaluated by the site characterization

In this study we extracted fault compartment in Japan based on the Geomap Navi released by AIST. The extracted compartment structures are about 1,400 from Hokkaido to Kyushu district. Based on the histogram of the size of the compartment structure, the abundant size in Japan is 2.25-9 km² except for the Shikoku district. This size is almost correspond to the HLW repository area

Lower hydraulic gradient and flow velocity inside the HGCS could be suitable for the repository from hydrogeological view point, while slow recovery of the groundwater in the structure causing the long duration of the oxidation condition could not be suitable from the hydrochemical view point. Characterization of the bounded fault of the HGCS should be studied in detail in each case. Prediction of the groundwater flow and mass transport by the numerical simulations are also needed.

Keywords: hydrogeological compartment structure, geological disposal, site characterization, high-level radioactive waste, Geomap Navi