Estimation of hydrogeological flow field based on the data of long-term monitoring

Ryuji Takeuchi[1]; Yuji Fujita[2]; Kiyoshi Arai[1]; Walter Salden[1]

[1] JAEA; [2] JNC Tono

At the Mizunami Underground Research Laboratory construction site in Gifu Pref., construction of two vertical shafts, each to a depth of 1000m, began in 2004. By January 2006, construction of the two shafts reached a depth of approximately 200m.

Prior to the start of construction, a comprehensive, multiphase surface-based and borehole-based testing program was carried out to characterize the undisturbed geological environment and to record changes resulting from construction. The hydraulic groundwater pressure and deformation of the bedrock are monitoring in order to understand the change in the geological environment resulting from the shaft excavation activities.

Several near-vertical faults that cross the URL site were identified using mapping and geophysical methods and their hydrogeological properties have been investigated using single and multiple borehole well test methods. One fault in particular was identified by early mapping and has subsequently been shown to be a hydrogeologically significant groundwater flow barrier.

Multi-level groundwater pressure monitoring data, which covers the pre-construction, well testing, and early construction phases are analyzed. These data show strongly differing pressure response behavior on opposing sides of the fault.

Moreover, downhole tiltmeters show displacement, both inclination and azimuth, resulting from the excavation activities.

In this study, we report on the results of the estimation of the hydrogeological flow field by use of the hydraulic pressure and deformation data in bedrock.