

Measurement of deep underground stresses in geologically stable region

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Knowledge of in-situ stress state is of great importance when planning the high-level nuclear waste repository. Using the stress data measured by the stress release method, JNC reported in the 2000-year report that the ratio of the average horizontal stress to the vertical stress became 0.5-2.0 at deeper depth. Larger horizontal stresses, however, were measured by the hydraulic fracturing method in Kanto-Tokai region. At Ashio site and Inagawa site, which are located in the earthquake swarm region, the very large maximum horizontal stresses of 70~80MPa were measured at deep depth. Underground stress state based on the data by stress release method is different from that based on the data by the hydraulic fracturing method. The reason has to be solved. I guess a plausible reason is the topographic effect or the geological activity.

A borehole of 320m deep was drilled in 2001 in Okayama city, where seismic activity is low and the geodetic strain change is small as well. The stresses were measured at 5 points by the hydraulic fracturing method. As a result, the minimum and maximum horizontal stresses at the depth of 68m were 4MPa and about 8MPa, respectively. The minimum and maximum horizontal stresses at the depth between 180m to 306m were about 8MPa and about 13MPa, respectively. The borehole will be extended until 1000m deep in 2003 and stresses will be measured at each 50m by the hydraulic fracturing method.