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Drilling and survey technology for controlled drilling - Development of hydraulic test, groundwater sampling tools -

Kimio Miyakawa[1*], Hiroshi Suenaga[1], Kenzo Kiho[1], Masanao Kanauchi[2]

[1]CRIEPI, [2]RaaX

We developed a well test system that can perform hydraulic test, groundwater sampling and imaging, for the controlled drilling. It is required to minimize stop period of drilling to keep well bore, the system is able to obtain hydraulic conductivities, groundwater samples and images of well wall by one run in the hole. Packers that seal up a test section while the hydraulic test and the groundwater sampling are inflatable by drilling fluid (mud). Therefore, water lines from the surface to a test section is unnecessary, which can be shorten preparation time of the well test. Inside wall image of the test section is provided by an acoustic sensor equipped on top of the system prior hydraulic test and groundwater sampling, which is available to prompt selection of the test section.

We applied this test system to a controlled drilling well that was passed through Omagari fault distributing at the Kami-horonobe area in Hokkaido. Well tests are conducted seven sections in 80 0m well length. Hydraulic heads are pressurized and hydraulic conductivities are under 10-9m/sec near-by Omagari fault, is suggested that this fault acts as a hydraulic seal. Variation of salinity in sampled groundwater was 25-30% of sea water, and contamination by drilled fluid is under 1% volume of sample.

This study was done under contracts awarded from METI (Ministry of Economy, Trade and Industry) and in-situ drilling and survey was conducted as a collaboration work with the Horonobe Underground Research Center of JAEA (Japan Atomic Energy Agency).

Keywords: Geological disposal, Controlled drilling, Hydraulic test, Groundwater sampling