

## Development of Technology on Long Term Monitoring in the Borehole and it's Application

\*Kenzo Kiho<sup>1</sup>, Akira Shidai<sup>1</sup>, Yuichi Tomioka<sup>1</sup>, Shuji Matsumura<sup>2</sup>, Yasuji Saito<sup>3</sup>, Masashi Kato<sup>4</sup>

1.Central Research Institute of Electric Power Industry, 2.KUMAGAI GUMI, 3.Tokyo Electric Power Services, 4.Geothermal Energy Research & Development

In Japan, there are three stages of site-selection for the deep geological disposal of HLW. Literature surveys, followed by preliminary investigations (PIs) and finally, detailed investigations (DIs) are carried out in successive selection stages. Underground survey facilities are constructed in the final selection stage. Geological, environmental and radiological conditions might be affected by the construction of these underground survey facilities and the final depository. It is necessary to obtain the initial-state conditions of pore water pressure and water chemistry through long term monitoring of boreholes during the PIs in order to estimate the influence on geological, environmental and radiological conditions by the construction of underground facilities and the final depository.

Since 2000, CRIEPI has been conducting a project on the development of directional drilling and measurement/logging technologies. In FY2006, we began applying these technologies to the Omagari fault, distributed at the Kami-Horonobe area in Horonobe-town, Hokkaido (site no. HCD-3). After drilling the borehole of length 1000 m, a steel pipe was inserted to support the borehole wall. In FY2013, considering the hydro-geological conditions along the borehole, a Standpipe Multi Packer (SPMP)-type monitoring system was installed in the borehole. In FY2014, we began to measure the pore water pressure at three measurement intervals and in FY2015 ground water collection for water chemistry and ground water dating was started.

The data recorded on data loggers were collected every 3-4 months on site and the batteries were replaced at the same time. At the PI stage, we assume that long term monitoring for several boreholes will be achieved in vast areas where power supply and/or communication networks are not available. Thus, we are developing an automatic data acquisition system for long term monitoring, which enables us to access the data remotely.

The research and development for this study are funded by the Agency for Natural Resources and Energy, a subsidiary of the Ministry of Economy, Trade and Industry (METI) and have been carried out as a program for the systematization of the controlled drilling technology and measurement method used in boreholes. In situ drilling and surveying were conducted in collaboration with the Horonobe Underground Research Center of the Japan Atomic Energy Agency (JAEA).

Keywords: Pore Water Pressure, Water Chemistry, Stand-alone Data Acquisition System