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Development of Technology for Directional Drilling – Long-term Monitoring and Automatic Data Acquisition System -

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In Japan, there are three stages of site-selection for the deep geological disposal of High Level Waste (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 repository [1].

Central Research Institute of Electric Power Industry (CRIEPI) has been conducting a project for the directional drilling and measurement/logging technologies to survey hydro-geological condition at the PI stage [2]. 1000m length borehole was drilled by directional drilling technology in order to verify the drilling technology in Hokkaido. Long-term monitoring to clarify pore water pressure and water chemistry in the drilled borehole was also developed. Measurement intervals were set on a hanging wall side of a main fracture the measurement of pore water pressure was started in 2014. Ground water sampling for water chemistry and groundwater dating was started in 2015.

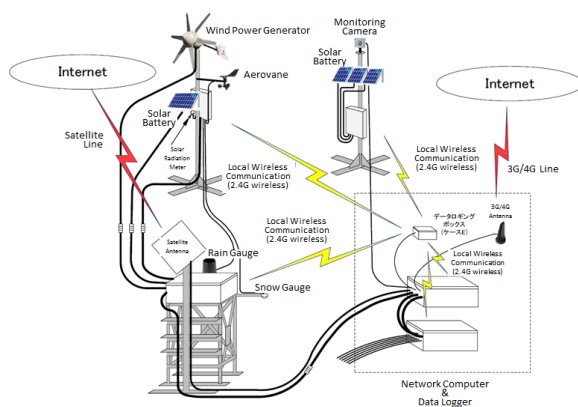


Figure 1: Configuration Diagram of Automatic Data Acquisition System

Long-term monitoring of several boreholes will be achieved in vast areas where power supply and/or communication networks are not available at the PI stage. Thus, we have been developing an automatic data acquisition system for long-term monitoring, which enables us to access data remotely [3]. The system is an automatic data acquisition system that performs long-term monitoring of pore water pressure. As for this system, the power is supplied from solar photovoltaic generation and/or wind on a local commercial communication network service. Power generation and data communication is secured through a satellite line or 3G/4G line. Real-time

consecutive monitoring is possible by remote control at the time of the event outbreak such as a big earthquake. Simultaneous monitoring is also possible by creating local wireless network for each survey point.

References:

- [1] Kurikami et al. (2010) Published by Nuclear Waste Management Organization of Japan (NUMO)
- [2] Kiho et al. (2015) 8th Asian Rock Mechanics Symposium, RW2-6
- [3] Shidai et al. (2016) WM2016 CONFERENCE, 16079

