

## Hydraulic Head Variation using the Multi-packer system in Fractured Rock in Yuseong area

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### ABSTRACT

The High Level Radioactive Waste (HLW) disposal concept in Korea is a multi-barrier system (engineering barrier system and natural barrier system) within the underground of crystalline rocks. The key factor of HLW disposal is an understanding of deep underground environment. Therefore, generic study for evaluating the deep environment has been performed on two study sites (Yuseong and Goseong). In the Yuseong site, total 11 deep boreholes (YS1, YS2, YS2-1, YS2-2, YS3, YS4, YS5, YS6, YS7, KP1 and KP2) were drilled. The multi-packer system (West bay Co.) was installed in 3 boreholes (YS1, YS4, YS7). A variation of hydraulic head is monitored at each depth of the multi-packer installed boreholes.

This study aimed to evaluate the hydraulic characteristics and define the hydraulic boundary using the variation of hydraulic head. The site descriptive model will be constructed through the acquired geological, hydrogeological and geochemical data. A variation of hydraulic head in the borehole YS1 shows that there are a decompression zone and a pressurization zone at about 250m and 400m below ground, respectively. It is interpreted that there are two pressurization zones at about 100m-150m and 250m below surface through a variation of hydraulic head in the borehole YS4. In the borehole YS7, there is pressurization zone at about 370m below ground level. Through the hydraulic head variation data, we understand that there is hydraulic head-governing zone at study site and it may affect the hydrological system of study site. The presence of hydraulic head-governing zone can be also used to organize the site scale hydrogeological model. For example, the water level of YS2 (200m) and YS3 (300m) shows different values even if the distance of two boreholes is very close (7.1m). It might be caused by the decompression zone observed in YS-1 and it has affected the hydraulic system around in the borehole YS-1. Viewed in hydraulic boundary problem, the head bearing zone might consider the hydraulic boundary dividing the hydrogeologic system. This is demonstrated that the groundwater chemistry have different patterns at

decompression boundary in the borehole YS1. The definition acts as key to organize a hydrogeological model and to indicate that a hydraulic boundary of hydraulic head-governing zone is necessary to be more studied. But, it is no wonder that the hydraulic head-governing zone is an important feature for understanding of groundwater flow mechanism.

Key words : hydraulic head, hydrogeological model, hydraulic boundary, multi-packer system, hydraulic head-governing zone

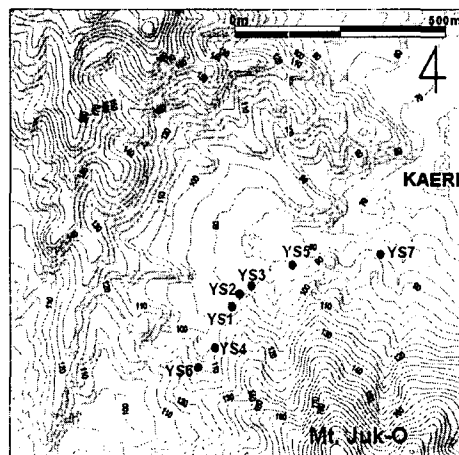
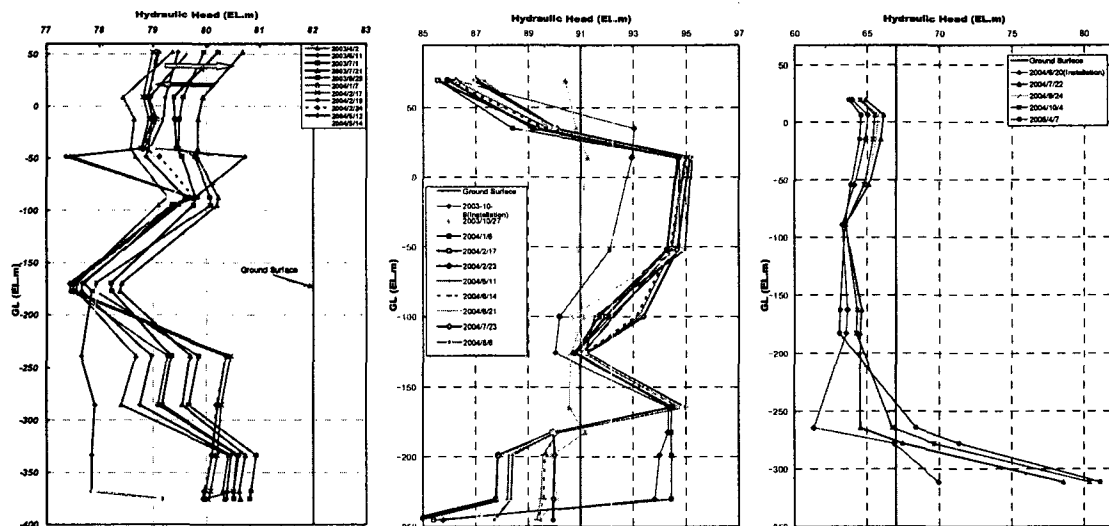


Fig. 1 Location of boreholes in study area



(a) borehole YS1

(b) borehole YS4

(c) borehole YS7

Fig. 2 Variation of hydraulic head in the borehole YS1, YS4 and YS7