

## A natural analogue study on bentonite-water reaction and ophiolite-water reaction -an example in Mangatarem, Phillippine

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In the geological disposal of high level nuclear waste (HLW) and the TRU waste, it is examined to secure the long-term safety with the multibarrier system for the artificial barrier (glass, over packing, bentonite) and the natural barrier (stratum and groundwater). However, the bentonite changes in quality of the bentonite by the chemical reaction (water-rock reaction) of the disposal stratum, and the bentonite is feared declining of the function as the barrier. Especially, to use cement for the underground structure and nuclear waste, it is thought as a result that it is indispensable to analyze the behavior of a long term water-rock reaction of generated by high alkali groundwater-bentonite reaction.

Because such a changing in quality reaction is slow in the rapidity of reaction, the resolution of the long term behavior is difficult at a laboratory. Therefore, called Natural Analogue is used. This is the methods of evaluating the waste disposal aptitude by a long term change which is about rocks and groundwater in a similar field to the geological environment from the past.

To execute investigation, Mangatarem, Phillippine composed by ophiolite was chosen as natural analogue field. The ophiolite is known as a rock that generates the high alkali groundwater to similar cement, and it is thought that geological investigation causes the resolution of the generation mechanism of high alkali groundwater. Moreover, it is confirmed that at some points, the high alkali groundwater is welled out. So the investigation of the high alkali groundwater in natural environment is also possible. In addition, at Saile Mine (betonite and zeolite mine), where has confirmed the points of contact between the high alkali groundwater and bentonite in the past (RWMC, 2008).

For the evaluation of change reaction by interaction between high alkali groundwater and bentonite, it is important not to grasp rock and mineral composition at ophiolite area, but to evaluate long term groundwater behavior and to resolve the generation factor of high alkali water at this area. In this study, it aims to consider the reactive mechanism of high alkali groundwater-bentonite reaction and the generation cause of high alkali groundwater by using long term simulation that uses the analysis data of groundwater and rocks at Mangatarem

For the simulation of the long term behavior of high alkali groundwater-bentonite reaction, called PATHARC.96, simulation software calculating the behavior of water-rock reaction in a closed system, is used. I guessed the time change of the amount of the mineral of the rock and the time change of groundwater composition by using PATHARC.96, and examined the generation factor of high alkali groundwater.

The following items were executed in this study.

1. Resolution of generation cause of high alkali groundwater at ophiolite belt
2. Resolution of reactive mechanism of high alkali groundwater-bentonite reaction.
3. Evaluation of waste disposal aptitude by using simulation of long term behavior of high alkali groundwater-bentonite reaction

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