# In-situ test on erosion of buffer material in high level radioactive waste disposal

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## Understanding of phenomena by in-situ test

Deterioration of function due to the outflow of buffer material in high level radioactive waste disposal is a serious problem. Processes in erosion of buffer material have been studied in [1, 2] and so on, but these are based on the results of laboratory tests. Therefore, an experiment aimed at reducing the influence of seepage pressure (which is the cause of the erosion) on buffer material was carried out at Hokkaido Horonobe URL. The slot between the host rock and the buffer material was filled with No. 4 silica sand (handling is easy), and the buffer material was allowed to stand for 2 years with the heating device in the disposal hole.

## Result and discussion

Consolidated materials were attached on cracks accompanied by groundwater. These nodules were found to have a structure in which constituent particles (such as quartz) of silica sand are bound by calcite. Calcite reduces the free volume between the silica sand in the silica sand filled region (i.e. effective porosity). Also, these nodules act as plugs of cracks. Therefore, it is estimated that it has the effects of reducing the seepage pressure and inflow rate of groundwater.


Figure 1: Test result

Calcite is known to have lower solubility at higher temperatures [3]. Therefore, in the case of erosion control using silica sand, the effect of calcite precipitation can be expected in actual disposal where the temperature of the surrounding environment is high, as in this test, although it depends on the water compositions. In the future, we plan to conduct experiments under various environmental conditions in situ to acquire quantitative data.

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[1] Liu et al (2006) SKB report R-06-103, 9-39. [2] Sane et al (2013) Posiva 2012-45, 3-50. [3] Langmuir(1997) Aqueous Environmental Geochemistry, 206.