

## Hyperalkaline natural analogue potential at central Palawan in the Philippines

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Hyperalkaline groundwaters produced by serpentinization of ophiolites can be considered natural analogues of the leachates produced by low alkali cementitious materials in repositories for radioactive waste. Evidence from the Saile bentonite mine at the westernmost end of the Zambales ophiolite in Luzon shows indications of previous reaction of smectite clays with the alkaline natural groundwaters. At this site, secondary minerals such as Fe-montmorillonite, Fe-saponite and K feldspar was formed in the alteration zone by the reaction, but the alteration was restricted to a maximum of 5 mm from the clay/groundwater interface. However, as this example is from a 'defunct' groundwater/clay reaction site, many uncertainties exist regarding original groundwater chemistry, duration of reaction time etc. Consequently, it was decided that the evidence for minimal reaction of the bentonite would be strengthened by examining a site of currently ongoing groundwater/bentonite reaction.

A relevant site was identified in Narra, in central Palawan, SW Philippines. Here, hyperalkaline groundwaters (pH11, low Eh, 35~45°C and high Ca content) from ongoing serpentinization reactions in the underlying harzbergite bedrock seep into overlying ultramafic sediment where smectite (Fe-saponite) was identified.

These preliminary results, indicate that the Narra site is worth investing to study influence of hyperalkaline fluid on bentonite in the engineered barrier system containing cement materials and iron waste packages by observation of smectite under hyperalkaline condition and comparison with the previous results from the less well defined Saile study and work from similar work in Cyprus.

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