OR/12/023 Summary

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Wragg, J, Rushton, J, Bateman, K, Green, K, Harrison, H, Wagner, D, Milodowski, A E, and West, J M. 2012. Microbial Impacts of CO2 transport in Sherwood Sandstone. *British Geological Survey Internal Report*, OR/12/023.

Work carried out by BGS and the Japan Atomic Energy Authority (JAEA) has shown that microbial processes can have profound effects on the transport properties of host rock (i.e. the movement of fluids and contaminants through the host material) relevant to radioactive waste disposal. Recent research, performed as part of the BGS Radtran project, has examined Sherwood Sandstone samples in the context of radioactive waste disposal; this particular formation is also a potential reservoir for carbon dioxide storage in the UK. As part of the BGS opportunities fund programme, this project has, for the first time, evaluated interactions between fluids saturated with carbon dioxide/Sherwood Sandstone/microbes *(Pseudomonas aeruginosa)* in transport experiments, using BGS developed apparatus under pressurised subsurface conditions. This pilot study has highlighted the impacts of differences in the physical characteristics of core Sherwood Sandstone samples collected adjacent to each other in a core sample, and the ability of *P. aeruginosa* to survive in CO_2 saturated artificial groundwater and the potential to form a biofilm in an environment suitable likely to be found at a carbon capture and storage location. These results demonstrate that in this short study, the injection of *P. aeruginosa* into the biotic experiment does not appear to impact on the physical transport properties of the Sherwood Sandstone, although the presence of CO_2 appears to enhance the mobilisation of a number of chemical species. However, in other work which utilised the same organism and rock type but without introduction of CO_2 saturated fluid, post-inoculation injection changes were observed. These included short but rapid saw-tooth like changes in the pressure profile (Wragg et al, 2012[1]). These impacts were not observed in the current study which suggests that the CO_2 saturated fluid was impacting on the ability of the microbes to alter permeability. This short study has, however, indicated the need to carry out longer term investigations to reproduce these initial findings.

References

1. ↑ WRAGG, J, HARRISON, H, WEST, J M, and YOSHIKAWA, H. 2012. Comparison of microbiological influences on the transport properties of intact mudstone and sandstone and its relevance to the geological disposal of radioactive waste. *Mineralogical Magazine* 76, 3251–3259.

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