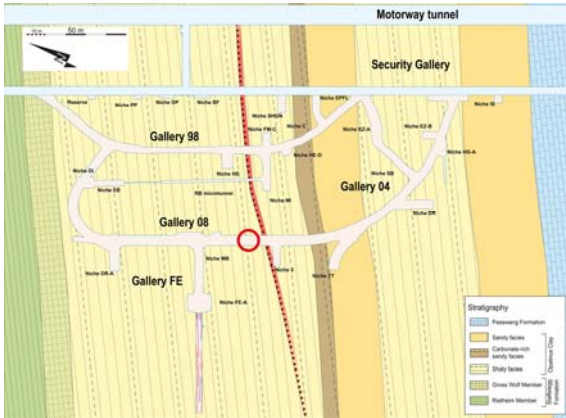




5 Microbes in rocks



Objective: To understand the activity of microbes in the deep subsurface and how it might impact the disposal of radioactive waste. Microbes are ubiquitous and are able to catalyze many chemical reactions of relevance for radioactive waste. In particular, the production of hydrogen gas from the anoxic corrosion of steel canisters has the potential to serve as a source of energy for microbes.

Procedure: A borehole was used to evaluate whether microbes would grow in the presence of hydrogen gas. For 500 days, hydrogen gas was added weekly to the borehole and changes in the chemistry and the microbial community were monitored. For example, after a few months, bacteria able to transform sulfate into sulfide (the compound responsible for smell of rotten eggs) grew and consumed hydrogen gas. We also used sophisticated molecular techniques to reconstruct the microbial food web that established itself in the borehole.

Results: The results show that hydrogen gas fuels the growth of bacteria that can use CO_2 as a source of carbon to grow. These microorganisms produce organic carbon that is, in turn, used by

other microbes that transform organic carbon to CO₂. Thus, a complete carbon cycle is established in the borehole. This experiment showed that hydrogen gas would not readily accumulate if space and water are both available in the repository.

Start:	2004
End:	ca. 2020
Project Partners:	Andra, BGR, FANC, Nagra, NWMO, Swisstopo
Costs:	760'000 CHF