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Longyearbyen CO2 lab – prospects after the pilot project

Alvar Braathen[1], Gunnar Sand[1], Atle Mørk[2], Maria Jensen[1], Karoline Bælum[1], Harald Elvebakk[3], Fred Hansen[1], and the project team
1- UNIS, the University Centre in Svalbard, Longyearbyen
2- SINTEF Petroleum Research, Trondheim
3- NGU, Trondheim

Longyearbyen represent a unique location for studying energy and climate-related issues with its closed energy system, using coal as the main energy carrier, and also representing a key location for analyzing possible climate changes. And not least, Svalbard and its green profile have significant national and international attention. By the end of 2009, the Longyearbyen CO2-storage project by UNIS and partners summarize results of the pilot study aimed on subsurface sandstone aquifers that can receive CO_2. The next phase could qualify injectivity and storage capabilities of the reservoir sandstones, as the project moves towards CO_2 injection in a subsurface laboratory.

The targeted aquifer is at approximately 1000 m depth, consisting of continental and shallow marine sandstone units of upper Triassic age. In order to further constrain the quality of the targeted aquifer for CO2 injection, a number of subjects have been addressed in an integrated operation: (1) Drilling, (2) water injection tests, miniperm and plug analyses, (3) core logging and sampling for property analysis, (4) electrical logging, (5) outcrop mapping, (6) seismic mapping, (7) digital elevation model construction, (8) high-Arctic permafrost analysis, (9) subsurface geo-modeling, and (10) flow simulations.

Results from outcrop data and seismic analysis constrain the geometry of the targeted aquifer, which climbs gently towards the surface in the NE. Results from four dill holes show shallow aquifers with variable permeability and porosity properties according to the pre-drilling prognosis of partly cemented rocks. Sealing properties are confirmed for the cap-rock mudstones. However, the prognosis also predicts better properties in the targeted reservoir, which is the target in drill hole 4. Results from this well will be presented. Further, the datasets show a significant potential for secondary permeability by fractures in sandstone, generated during Tertiary regional contraction.

Results of the recent drilling of a forth well (Dh4), finished in November 2009, has significant bearing on further activity in the project. This contribution dwells on the results of the Dh4 core and well log materials and the well injection/leak off tests. These results form the base for a discussion of plans and ambitions of the Longyearbyen CO2 lab in the years to come.