CO2 STORAGE: FLUID FLOW MODELING COUPLED WITH GEOMECHANICS, SNØHVIT FIELD.

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Abstracts

CO2 storage in the Snøhvit field, Barents Sea started in 2008 with injection into the Tubåen formation at an approximately depth 2700 m. It is planned to inject 23 million tons CO2 in a 30 years period. The Nordmela formation above the Tubåen formation constituting the cap rock , have a thickness of 50 to 100m. The injection target - Tubåen reservoir rock is a fluvial deposits with marked channels. Thus, high-quality reservoir rock part occupy only part of the formation. A two-dimensional flow model was built to simulate CO2 injection with the operation history and desired planned injection. CO2 was injected into one well located at the northern flank-segment of the Tubåen formation. With the injection operation, reservoir pressure build-ups and dropping followed the frequent injection ceases. There are several main faults that cut the Tubåen formation and Nordmela formation into segments. In the simulation model, the faults have been assumed closed and only upper boundary is defined as a displacement boundary, the others are fixed. According to the results of the model, the reservoir pressure increased especially near by the injection well. To keep reservoir pressure under fracture limit of the Tubåen formation as well as cap rock (Nordmela formation), the amount of CO2 injection was only one fifth compared with the project plan. Injection rate of CO2 had to decrease in order to maintain a safe limit of pressure. The results showed that the increasing fluid pressure caused around 7cm uplift of the top of Tubåen formation and also indicated a high risk of fracturing along the two faults that is closest to the injection well. Around the injection well also a heave like an ellipse arch was observed.