

RISK OF PROGRESSIVE PRESSURE BUILD UP IN A SEALED CAVITY

Manfred Wallner and Willem A. Paar
Federal Institute for Geosciences and Natural Resources, Hannover, Germany
AKZO NOBEL, Hengelo, The Netherlands

Summary:

Abandonment and sealing of cavities has been subject of many investigations in recent years. The practical application with respect to long-term performance is still missing. However, the technical and scientific basis for safe sealing has been developed by means of investigating the processes and understanding the underlying principles.

Results of a comprehensive study carried out by AKZO NOBEL are:

- Time dependent stress redistribution and corresponding deformations around cavities due to creep are understood as the basic mechanism for long-term behavior.
- Hydraulic fracturing tests can be properly evaluated by means of numerical simulations.
- Cavity convergence and surface subsidence showing the dependence on creep parameter of rock salt and on cavity geometry have been investigated in details by numerical simulations.
- The risk due to progressive pressure build up in a sealed cavity has been numerically simulated. Due to a very slow pressure increase, a critical internal pressure at the top of the cavity will only be reached after long times. Since the rock salt formation becomes permeable after exceeding lithostatic stress, geomechanic/geohydraulic interaction has to be considered. As a result of parametric computations the leakage rates have been determined which are rather small. No risks with respect to stability have been encountered.