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Technical Conference Paper

Geology and Technology for Brine Injection into Deep Saline Aquifers – Findings of Longterm Planning, Operation and Monitoring

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Depending on the regional and infrastructural settings of a salt diapir, the disposal of brine is among the items to be clarified from the very first considerations about constructing a cavern storage site. As an industrial use of the brine or a discharge into the sea or a river is not possible in each case, the injection in deep saline aquifers is an environmentally friendly and economically feasible option.

The geological conditions and available reservoirs define the framework for brine injection. Whereas the quality of the salt to be leached and the desired leaching rate are the input parameter for defining the leaching steps. The technology to be used for brine conditioning and injection has to be adjusted to the parameter of the target reservoir. Regarding the long term reliability of the injection process, this adjustment is critical, especially as each location/project has its own characteristics and no standard solution exist.

Two main aspects of the target horizons with strong influence on the technology and the permitting procedure are the pore space structure and the tightness. Especially the last one turned out to be critical for the costs because of the optional need for additional observation wells or sophisticated monitoring programmes. The monitoring programme has to meet the requirements related to the sensitivity of the environment.

The experiences gained while injecting $8 * 10^6$ m³ (current status) of brine and increasing the reservoir pressure (top) from 130 to 166 bar at the location of Schwerin (E.ON Hanse AG cavern storage site Kraak) showed that a useful monitoring system produces reliable data and predictions and therefore increases the acceptance of the injection by the authorities and the inhabitants. This approach was also used at the location of Heckelberg (EWE AG cavern storage site Rüdersdorf), where the use of different reservoirs at one site, each with specific properties, is a more challenging task. First results confirm the initial considerations and show that also under complex geological and legal conditions the injection of brine is a feasible solution.

Due to the smooth operation at Schwerin, it is planned to extend the injection at this site to other horizons with new requirements for monitoring. Furthermore it is intended to calculate the geomechanical aspects and limits of an increasing pressure within the currently used reservoir.

Both projects show, that brine disposal by injection is an environmentally friendly, technically fully developed and economically feasible part of cavern construction. Its use is not limited to projects with no alternative solution, but has to be evaluated right from the start of planning.

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