Dimensioning of Large-Volume Brine Production Caverns Using an Extended Data Base

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Abstract

In the solution mining industry the costs for the cavern well including the required above ground infra-structural installations are an important factor within an economical evaluation. By increasing the cavern volume the produced amount of salt per single cavern is increased and therefore the specific costs may enormously be reduced because for a specified depth of the cavern roof the costs for the well and the necessary infrastructure remain the same. However, for a given geological environment the maximum volume of a single cavern is limited. Besides the geological conditions the maximum cavern volume mainly depends on geomechanic constraints. Basically, for cavern dimensioning an extremely conservative approach is applied resulting from the limited knowledge about the in situ material behaviour of the saltrock.
For the Staßfurt brinefield, Germany, five-million-cubic-meter brine production caverns have been designed using in situ data in form of pressure build up tests and long-term subsidence measurements in addition to the normally used lab data.
The paper presents how in situ data is acquired and interpreted and how it is reflected by modelling results. Finally, conclusions concerning the allowable cavern configuration and expected cavity convergence and resulting subsidence will be given.