

Induction of Subsidence by Brine Removal

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Abstract

Surface subsidence in the Hengelo brine field, The Netherlands, is brought about by upward migration (stoping) of overmined salt solution cavities due to subsequent failure of individual roof layers. Initially migration is often arrested, sometimes for more than 25 years, in a relatively strong anhydritic layer of about 20 m thickness directly overlying the salt deposit. For a number of cavities failure of the anhydritic layer has not even started yet. This brings about an uncertainty about the development of future subsidence over time and hampers the development of abandoned areas of the brine field.

By means of analytical- and numerical modelling, using the finite difference program FLAC, it was found that failure of an anhydritic roof layer of 50 m radius and 2.5 or 5 m thickness above a brine-filled cavity is not to be expected, but that it can be triggered by partly emptying the well by means of a deep well pump. However, at certain conditions triggering roof bed failure seems impossible for a roof layer of 10 m.