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Cavern-induced Subsidence – New German Regulations and Operating Requirements

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Abstract

Following several changes made to the Federal Mining Act in recent years the operators of cavern systems in Germany now have to comply with a number of extra requirements. This paper starts with an outline of the current statutory fundamentals for operating caverns and then describes what these fundamentals require of cavern operators as regards the handling of cavern-induced ground movements.

One of the latest changes is that the burden of proof has been reversed when a certain amount of subsidence has taken place. If subsidence of least 10 cm has occurred within the influence zone of caverns and there has been damage to property, which by its nature could be mining damage, then the cavern operating company must answer for the damage or prove that the damage was not caused by the cavern operations.

Moreover, under certain conditions environmental impact assessments now have to be carried out for cavern storage. This involves calculating and analyzing in detail the effects at the surface of cavern operations. Of crucial importance here is a prediction of the subsidence expected. The technical requirements as well as the mathematical technique for making subsidence predictions are described. Besides the vertical components of movement (subsidence and tilt) also the horizontal components (horizontal displacement as well as compression and tension) are described. In order to be able to make a reliable estimate of any subsidence that can be expected in the future it is necessary above all to know the cavern convergence as precisely as possible. This can be deduced from sonar cavern surveying, from subsidence monitoring at the surface or by applying suitable modeling algorithms.

Key words: Subsidence, prediction, mining damage, regulations, Germany