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MEETING
PAPER

The Impact of the Operating Mode of Gas Storage Caverns on Convergence Development

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In contrast to brine- or oil-filled caverns, gas storage caverns are governed by particular requirements and factors as regards their design, dimensioning and operation. These requirements and factors have been subject to considerable modification and expansion over the last few years, since, on the one hand, these facilities should be used cost-effectively and, on the other hand, the structural stability of the caverns must be ensured.

The Epe cavern storage facility is only one of several gas storage facilities operated by Ruhrgas AG. The Epe storage facility, comprising 32 gas caverns with a working gas volume of 1.6 billion m^3, is one of the largest facilities of its kind. It is planned to be extended in the near future. The Epe caverns vary in form, volume and depth and may be found at different geological locations throughout the facility. A complex engineering concept has to be implemented in order to optimally comply with all operational and economic marginal conditions as well as the requirements stipulated by mining authorities.

This concept is governed to a considerable extent by knowledge about convergence and the relative shift of cavern walls (elongation, distortion), depending on the individual cavern operating mode. PLE has therefore developed a method to generate performance diagrams for operating modes and the resulting cavity convergence and elongation, using a rock-mechanical FEM program. This optimization procedure means that the relevant performance diagrams can be accessed without time-consuming FEM calculations.