

Rock Mechanical Design for a Planned Gas Cavern Field in the Preesall Project Area, Lancashire, UK

Reinhard B. Rokahr, Kurt Staudtmeister, Dirk Zapf

Institut für Geotechnik, Abteilung Unterirdisches Bauen (IUB)
Leibniz Universität Hannover
Welfengarten 1a, D30167 Hannover, Germany

Abstract

In the Preesall project area a new cavern field is planned for the storage of gas.

The planned caverns are located at shallow depth and the site-specific rock mass is bedded salt with layers of defiled salt.

Beneath the basic design parameters with the maximum and minimum internal cavern pressure a central aspect for cyclic loading in such a cavern is the allowable withdrawal respectively injection rate.

These operation modes for gas storage caverns in rock salt mass require a detailed rock mechanical consideration of thermal induced stresses in the vicinity of the caverns. The change of gas temperature during operation cannot be neglected anymore, because this has significant consequences on the stress state at the cavern wall. For that a thermo-mechanical coupled calculation is necessary.

The investigations are designed to determine the maximum pressure change rates at which a planned cavern can be operated without jeopardising the stability of the cavern and without compromising the tightness of the cavern.

The paper shows that it is possible to build a stable and gas tight cavern in such a complex geological situation.

Keywords: *rock mechanics, gas cavern design, shallow depth, cyclic loading*