

Potasio Río Colorado Pilot Cavern Creep Modeling Using *FLAC3D*. Comparative Analysis with Values Obtained from Sonar Mapping and Pressure Measurements inside the Cavern.

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Abstract

The PRC mining project considers the extraction of potassium chloride by dissolution from deep deposits.

In late 2008, geotechnical feasibility studies were developed, from which a predictive numerical model was developed comparing the geomechanical model with field observations associated with the pilot cavern.

This study compared the change of fluid pressure in the cavern from June 2008 to June 2009, with the volume changes estimated by sonar images recorded in the cavern, in relation to the deformations by creep of the layers of salts during that period.

The model in *FLAC3D* simulates the evolution of the cavern from the end of its development in April 2008 to sonar mapping made on June, 2009. There are three aspects to consider for developing the model, namely the geometry of the model, the characterization of material response and the behavior of the cavern. The geometric aspects of the model are based on sonar mapping of the cavern, conducted in June 2007, repeated in June 2009.

The material characterization is based on creep tests performed on core samples, and the behavior of the cavern using standard *FLAC3D* models. Sonar results showed a 2.2% cavern closure, while the model predicted 4.2% based on 2005 creep parameters, and 3.5% based on 2009 parameters. The model correctly predicted the cavern pressure increase 1.58 MPa when using the 2009 parameters (1.89 MPa using 2005). Consequently it recommended that creep tests and field data regards the cavern pressure and sonar surveys be kept during cavern field development for geotechnical evaluation.

Key words: creep-mining-cavern-sonar-numerical model