

## Abstract

The magnesium chloride mine operations of Nedmag Industries at Veendam have been the subject of earlier presentations at the SMRI.

Magnesium chloride is extracted from several thick layers of carnallite and bischofite at a depth varying from 1300 to 1600 m. These layers are embedded in the upper part of a large halite deposit of the Zechstein III (Leine) evaporation cycle.

Large-scale mining operation has begun in 1980 by creating separate caverns with a limited size and using an oil blanket roof control method. The separate caverns were kept at lithostatic pressure.

In 1993 (test) and 1995 (final) Nedmag and government agencies (state and local) agreed to change the mining method drastically, by reducing the cavern pressures and allowing the Mg-salt to flow (squeeze) towards the caverns, to be solution mined. The recovery of especially the purest magnesium chloride-source (Bischofite) increased with probably an order of magnitude.

The method of injection and production has changed over time, interconnecting 8 wells with an area of about 1 km<sup>2</sup>. An optimised well lay out was the logical consequence.

This paper is a summary of 10 years of (what could be called) wild brining in the Netherlands, describing the monitoring and predicting tools of the mining process itself and the possible surface consequences (subsidence, damage, etc).

In order to optimise and control this underground process better, methods were sought to improve the insight of cavern and cluster development. Sonar measurements of the large labyrinth like cavern are not possible. It was decided to create a so-called 3D computerised model of the mine, showing the more significant features of the formation, the boreholes in that formation, and the development of the caverns and the interconnections between the caverns. This model should support future decisions on the mine development and the mining operation.

As a first step a pilot model was build focussing on two caverns, which were not connected to the other caverns until 2002. This pilot model has been completed and is already being used to improve the insight in the underground processes.