

Rock Mechanical Problems of Shallow Salt Mines in Cheshire, UK

O. Rolfs, F. Crotagino

Kavernen Bau- und Betriebs-GmbH (KBB), Karl-Wiechert-Allee 3, 30625 Hannover, Germany

0. Abstract

This paper outlines the history of salt extraction in Cheshire, Great Britain, and briefly describes the handling of typical rock mechanical problems associated with the investigation of shallow salt mines.

The Northwich salt reserves were exploited long before the Industrial Revolution (extraction began around the middle of the 18th century). A combination of salt extraction methods were used which interacted with one another. The salt was exploited by extracting brine and also by means of classic room and pillar mining. The recovery rate in the mines was extremely high at close to 95 %. This fact, and its combination with the local hydrogeological conditions, frequently led to collapse of the underground workings.

On the basis of the numerical calculations that have been carried out, it will be shown how the real 3D situation in the mines can be considered on a 2D basis in shallow mines at depths of only around 100 m. The factors which must be taken into account to describe the load bearing system as accurately as possible are also discussed. Various options are available to describe the system in 2 dimensions. Because of the shallow depth, special attention must be given to the correct description of the combined load bearing system which develops incorporating the mine pillars and the rock salt above the mine.

1. Introduction

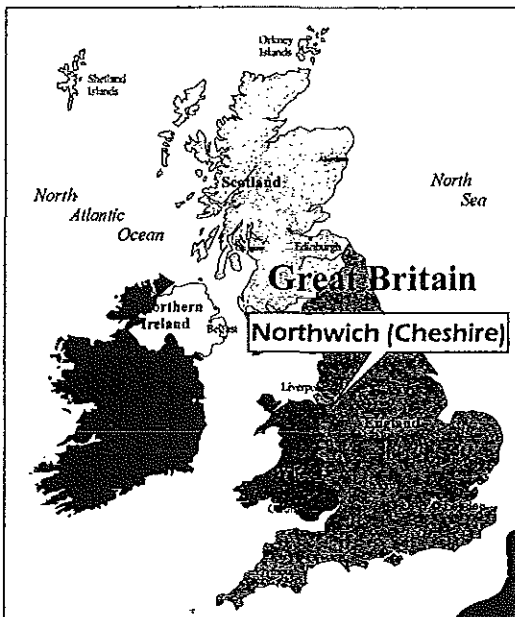


Fig. 1: Location map

There are a number of salt mines in the County of Cheshire near Northwich, U.K. (fig. 1). The majority of these were flooded long ago and some have in part collapsed.

From different sides numerous investigations were carried out in the past in an attempt to improve the understanding of the load bearing behaviour of the mines in this area. The following provides a brief history of mining in the area and then looks at the various approaches used for the 2D rock mechanical appraisal of real 3D conditions.