Solution Mining Research Institute; Fall 2004 Technical Meeting
Berlin, Germany, October 3 - 6, 2004

Salt Deposits and Gas Cavern Storage in the UK with a Case Study of Salt Exploration from Cheshire

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Abstract

The use of salt caverns for gas storage is well proven and has been in use for over 40 years worldwide. As the UK moves to become a net importer of natural gas in the next few years the opportunities in developing more gas storage particularly in salt caverns has arisen.

The United Kingdom has a number of salt deposits. Mining for salt production is one of the oldest industries in the country. The technology for solution mining of salt caverns has developed rapidly during the last century including the introduction and use of salt caverns for the storage of gas and wastes.

Nevertheless, not all of the salt deposits in the UK are suitable for gas cavern construction. The first part of this paper gives a geological overview of the major salt deposits in the UK and an outline of the individual gas cavern storage projects from the geo-technical standpoint. The paper describes the distinctive features of the existing and planned gas cavern storage projects.

The final part of the paper is a case study of a recent salt exploration for the ScottishPower gas cavern storage project in Cheshire, which is located near Byley, south of Northwich, on the IneosChlor Enterprises Limited (ICEL) Holford Brinefield.

The results of the fieldwork are based on a seismic survey and an exploration well. The interpretation of seismic data proved the depth and integrity of the proposed storage area.

To calibrate the existing seismic data and allow pre-stack depth migration and final seismic interpretation, a Vertical Seismic Profile (VSP) was recorded in the exploration well, drilled in 2003 to TD 731.5 m. Geological investigations, measurements and tests were carried out in the exploratory well.

A geo-technical novelty for the Triassic salt beds used for gas storage in the UK, was the successful proof of gas integrity of the insoluble marl beds at the planned storage depth zone by packer tests. The permeability identified in the formation integrity tests is being regarded as tight.

Key words: Gas storage, salt caverns, UK, Cheshire,