

Evolution of structural concepts of a complex diapir – NE Germany; Kraak

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ABSTRACT

The diapir of Kraak in NE Germany was due to its position near the supply area of HGW (a regional gas company) and its favourable geological conditions selected for the construction of storage caverns for natural gas.

The local geology is dominated by the accumulation of the Zechstein salt in the salt dome. The initial thickness of the salt is estimated to a maximum of 1100 - 1400 m, where of most was built by the Staßfurt Series (Z2). The current thickness varies strongly depending on the mobilization of salt. In some areas it is squeezed to a minimum of about 100 m or less, where as in salt domes it is accumulated up to several thousands of meters.

The presence of the diapir is known since the first areal geophysical surveys in the first half of the 20th century. The first wells for analyzing quality and depth of the salt were drilled in the early 60ies. Later seismic campaigns were oriented on the much deeper top of the Rotliegend, so no specific new data about shape or build-up of the diapir were gained. As a result the diapir was interpreted as a block shaped structure with more or less perpendicular flanks and an intensively folded but generally unknown internal structure. In the 80ies several wells were drilled in the surrounding of the salt dome for exploring the geothermal potential of the Mesozoic sandstones. The salt movement in time was better understood and a precise reconstruction of the sedimentary fillings of the peripheral sinks (primary and secondary) was possible. In the 90ies a revision of the old seismic data combined with new gravimetric mappings led to a different concept for the diapir flanks and the structural history of the salt dome.

The three wells drilled in the late 90ies for cavern leaching are located in the top region of the diapir, so new data about the internal structure were gained. In all wells cores were drilled, lots of wireline logs were run and intensive geochemical tests were carried out, but the interpretation still keeps difficult due to the strongly folded salt. Based on some recognized trends about fold directions and bromine concentrations a model was built for geomechanical modelling of the storage site. The model is both, confirmed by the results of the leaching process and updated by the leaching results

The difficulties about the structural interpretation based on the three existing cavern wells show that there is still a lack of areal data in the diapir. As an important source for structural information the development of the cavern shape during the leaching process in combination with chemical analysis of the brine was used.

Keywords: diapir structure, structure model, cavern leaching, Germany,