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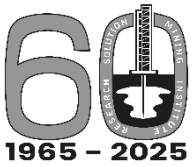

Transforming an Oil Cavern Field for Hydrogen Storage with Insights from the Rüstringen K410 Conversion

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Abstract

The Nord-West Kavernengesellschaft mbH (NWKG) operates 39 caverns at the Rüstringen site for the storage of various types of crude oil. As the demand for oil storage will decrease in course of the planned energy transition, thus freeing up storage space, it is planned to store green hydrogen in the future.

In preparation for this change, a concept for conversion of the Rüstringen site to a green hydrogen storage facility has been developed, which builds upon interdisciplinary cooperation spanning the fields of drilling, geomechanics, solution mining and geology. The concept is based on the current cavern field layout and the current storage medium. Accordingly, an initial determination has been made regarding which caverns should be abandoned due to their incompatibility for hydrogen storage. Secondly, a set of caverns that are suitable for conversion to store hydrogen have been identified. In the final step, potential locations for the construction of new caverns have been identified.

In order to provide insights into the practical implementation of this transition, a pilot project to convert the K410 oil storage cavern into a hydrogen storage cavern is introduced. For this project a comprehensive evaluation of the brine-filled cavern well has been conducted firstly, followed by the formulation of a systematic re-leaching plan as well as a geological assessment of the cavern. Subsequent to this, planning for the re-completion of the well is initiated. This planning encompasses the upgrading of the well in accordance with the prevailing state-of-the-art and the design of the resulting well completion for safe hydrogen storage.

Key words: rock salt, gas storage, salt caverns, hydrogen, conversion