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FEASIBILITY ANALYSIS OF USING ABANDONED SALT CAVERNS FOR UNDERGROUND GAS STORAGE IN CHINA

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Abstract

Using abandoned salt caverns for underground gas storage (UGS) has many advantages, such as saving construction time and investment. Rock salt in China is primarily bedded salt, usually composed of many thin salt layers and interlayers (e.g. anhydrite, mudstone, and glauberite). Thus, the feasibility analysis of abandoned salt caverns located in salt beds used as UGS facilities is full of challenges. In this paper, the feasibility analysis of China's first salt cavern gas storage facility using an abandoned salt cavern, located in Jintan city, Jiangsu province, China is introduced. The mechanical properties and permeability of the bedded salts are obtained by experiments. Based on the results, it appears that the abandoned salt caverns of China have a good feasibility to be converted to UGS facilities. The stability of the cavern is evaluated by numerical simulations, and the operating parameters are proposed accordingly. Results indicate that the maximum volume shrinkage of the cavern is less than 25% after operating for 20 years. China's first salt cavern gas storage facilities were completed, and gas was first injected, in 2007. To check the status of the caverns after operating 6 years, the volumes of the caverns were measured in 2013 by Echo-Sounding under working conditions. Measuring results show that the cavern shapes did not change much, and that volume shrinkages were less than 2%. Comprehensive results show that the feasibility analysis method proposed in this paper is reliable. Research results can provide references for the implementation of similar projects elsewhere in the world.

Key words: China, Abandonment, Caverns for Gas storage, Safety, Computer modeling