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A geological reappraisal of the Preesall Saltfield, Lancashire, United Kingdom: recognizing geological factors relevant to gas storage

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Abstract

Bedded salts are characteristic of halite developed in onshore UK, and are hosts or proposed hosts for underground gas storage sites in Cheshire, Dorset, Lancashire and Yorkshire. Geological assessments of proposed storage sites provide information that influences aspects of the planning, design and construction of facilities, including cavern and infrastructure placement and operational parameters. The Preesall Saltfield is located near Blackpool in north-west England and has been an area of interest for the underground storage of gas in solution mined caverns in thick bedded halite for over a decade. Interest in this area continues, driven by UK Government's need for additional gas storage in a bid to stabilize supply as the UK makes a transition to become a net importer of natural gas.

A comprehensive reassessment of the Preesall Saltfield has greatly improved the understanding of the structure, geology and processes that affect the area, providing key data that may influence the design of a proposed UGS facility. 3D modelling of the saltfield reveals it to be a north-trending half-graben, bound to the west by the Burn Naze Fault, preserving some of the thickest known halite deposits found onshore in the UK. Wet rockhead conditions are developed in the eastern part of the saltfield and were exacerbated during the 1900s due to poor brining techniques. Further migration of wet rockhead, which is now thought to be under a protective 'brine blanket', is unlikely if the current hydrogeological conditions persist. A detailed stratigraphy is proposed for the salt body based on the down-hole geophysical signature and geological core logging. Sedimentological studies indicate the halite predominantly crystallised in shallow to moderate water depths that periodically dried out, from foundered mats of halite crystals, with minor zones of cumulate development. This understanding addresses some of the geological factors relevant to an assessment of the suitability of the Preesall Saltfield as a host for UGS.

Key words: Bedded Salt Deposits; Computer Modeling; Computer Software; Geology; Seismic; Solution Mining and Salt History; United Kingdom; Preesall Halite; Triassic