A Study of the Approval Processes and Control Countermeasures Employed in the Context of Gas Reservoir Underground Storage Capacity

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Abstract

The significance of gas reservoir-type underground gas storage within the natural gas supply chain cannot be overstated. The precise assessment and effective regulation of storage capacity are critical for ensuring safe operations and optimizing economic benefits. This study introduces a multi-period inventory model and capacity control strategy specifically tailored for underground gas storage in gas reservoirs. Reflecting the operational characteristics of such storage systems, the storage profile is segmented into four distinct zones. Based on the primary factors influencing storage capacity in these zones, a comprehensive storage inventory model is developed, and a method for approving storage capacity in gas reservoir underground storage is delineated. Utilizing the reservoir inventory model, a suite of capacity control strategies is proposed through numerical simulation methods. These strategies encompass the optimization of injection and extraction schemes, enhancement of injection and extraction well networks, and the three-dimensional development of reservoirs. The aim is to achieve scientific management and efficient utilization of reservoir capacity. The results demonstrate that the formulated reservoir inventory model accurately captures the complexities of reservoir capacity fluctuations. Additionally, the proposed capacity control strategies are practical and highly operational. This study provides valuable technical support for the secure operation and strategic reserve management of gas reservoirs.

Keywords

Gas Reservoir-Type Underground Storage, Capacity Control Countermeasures, Inventory Modeling, Capacity Approval Methods, Capacity Master Control Influencing Factors