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OPTIMISING CAVERN DECOMMISSIONING BUDGET FOCUSING ON CUSHION VOLUME PREDICTION

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Abstract

Operators of energy storage facilities that utilise salt caverns as a storage facility are required to ensure future decommissioning of their assets can be conducted in a safe manner. The provision of a decommissioning liability is necessary to meet these requirements and ensure correct provisions are included in company accounts. One key aspect in determining decommissioning liability is the commercial value of the stored cushion gas. This value depends, inter alia, on the value of the cushion gas at the time of abandonment, and the volume of the cushion gas. Extrapolation of these factors into the future is not a straightforward process where the work presented in this paper will discuss predicting the cushion gas volume.

The cushion gas volume of a cavern depends on a number of parameters including a) the minimum allowable pressure of a cavern (Pmin), b) the gas temperature, and c) the total geometric volume of a cavern available for storage purposes. This work focuses on the impact that the geometric volume of a cavern has on the cushion gas volume prediction.

Past sonar surveys play a key role in understanding the expected operational behaviour of a cavern. Sonar surveys provide physically measured values, however as for all physically measured values accuracy issues exist in such surveys, such as measurement tolerances, cavern pockets, echometric survey's signal noise due to localised geometric anomalies and unplanned shut-in periods at low pressure. Projecting cavern geometry into the future means carrying over such issues which, if one extrapolates over 20- or 30-years, their effect will be amplified.

This publication will focus on evaluating accuracy issues in past surveyed geometric changes for estimating the future cavern geometric volume and its effect on cushion gas extrapolation. The procedure may be used by engineers in estimating the expected cushion gas volume at the time of decommissioning as accurately as possible and for introducing error bars to the estimated values. Goal of the proposed methodology is to allow operators to better estimate their required decommission budget allowing optimum financial control of their energy storage assets.

Key words: Cushion Gas Estimation, Sonar Surveys, Biases in Cavern Convergence Estimation