Determination of Salt Cavern Operating Pressures Using Rock Mechanics and Finite Element Analysis

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Abstract

TransGas operates 24 gas storage caverns completed in bedded salt. The caverns were originally used for winter peaking and to improve gas contract load factors. The gas transportation and distribution utilities operated as one company. The deregulation of the natural gas market in Saskatchewan changed how the gas company operated. The transportation and distribution utilities were still one company, but were now at "arm's length". Companies could now buy their gas directly from the producer and contract for both transportation and storage. The end result was increased storage utilization. Caverns would be completely cycled over the winter. The cavern pressures would be reduced to minimum levels at least once every year. The importance of maximizing the safe useable gas volume increased, as this was now a marketable commodity. TransGas decided to review our cavern minimum and maximum pressure limits, with the help of two consultants.

This paper reviews the results of our study to determine safe and practicable operating pressures for natural gas salt cavern storage using rock mechanics and finite element analysis. The paper examines selected storage caverns, and reviews the changes made in operating practices reached after the study was completed.