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CREEP CLOSURE RATE OF A SHALLOW CAVERN

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Abstract

Cavern creep closure rate was recorded in the SG13-SG14 salt cavern of the Gellenoncourt brine field operated by CSME at Gellenoncourt in Lorraine, France. Cavern compressibility and the evolution of cavern brine temperature first were measured. In this shallow cavern (250-m, or 800-ft, deep), which had been kept idle for 30 years, cavern-brine thermal expansion can be disregarded. To assess cavern closure rate, a 10-month brine-outflow test was performed, followed by a 6-month shut-in test. During the tests, brine outflow or pressure evolution is influenced by atmospheric pressure changes, ground temperature changes and Earth tides. From the average pressure-evolution rate, it can be inferred that the steady-state cavern closure rate is slower than 10^{-5} /yr (0.001%/yr, or 3×10^{-13} /s.)

A part of the material used to write this paper was already included in a paper presented during the Grand Junction SMRI Meeting. The update includes the analyses of atmospheric pressure effects, dynamic oscillations of the brine column, column temperature changes and brine crystallization.

Key words: Cavern abandonment, in situ test, salt creep

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