

OPTIMISING SOLUTION MINING COSTS BY REDUCING THE NUMBER OF WORKOVERS BASED ON LEACHING SIMULATIONS

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Abstract

At the Peckensen salt cavern storage in Germany, UGS and Storengy managed to leach 2 caverns with zero workover, and 1 cavern with just 1 workover. This significantly reduced the development cost of these caverns.

Untergrundspeicher- und Geotechnologie-Systeme GmbH is the engineering company in charge with the design and the operational implantation of the leaching process at the Peckensen salt cavern storage in Germany. This storage facility is developed and operated by Storengy, an affiliate of the GDF SUEZ group. Since 2007, three new caverns (Erg3 to Erg5) with an individual geometrical volume of 550.000 to 750.000 cm have been leached (Erg5 leaching to finish in December 2013). An important economical aspect of the solution mining of these caverns was to minimise the service operations during leaching.

In compliance with all rock mechanic requirements, the whole leaching process was planned to reach the predicted volume by minimising the number of necessary workovers, in the best case without using any work over rig, to avoid additional costs and a nonoperation period. To meet these targets the leaching string positions were determined by using the leaching simulation software developed by UGS and validated by parallel simulations using Storengy's own software. This included the pre-determination of the position of the outer leaching string (in the best case constant over the whole leaching phase) and the position of the inner leaching string for each leaching step. The combination of favourable geological conditions, substantial knowledge of the salt dome and furthermore reliable leaching scenarios set the framework for this challenge. Alternative scenarios meeting also the rock mechanic and economic criteria were anticipated to take into account imponderables. A further criterion was that solution mining could be ended anytime during the last leaching step, still with an acceptable geometrical shape.

Eventually the aim to reduce service operations was achieved, as the caverns Erg3 and Erg4 have been leached without any workover and the cavern Erg5 which is in the very last phase of the leaching phase only had the one planned workover required by the initial design. Most of the necessary adjustments of the inner leaching string were performed by cutting the pipe. It would even have been possible to exceed the target volume by meeting all preassigned criteria, as cavern leaching was stopped before reaching the maximum achievable volume due to project constraints.

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