

# Solution Mining of Thin Inclining Potash Deposits

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## 1 Introduction

The solution mining of thin deposits is an extremely technically demanding endeavour. This is illustrated by Fig. 1 which compares different solution mining techniques. Caverns, which are solution mined throughout the world for NaCl brine production or product storage, are normally constructed in very thick salt layers or salt domes. The deposit is opened up with vertical wells and each cavern is solution mined from one well. The average cavern height is 400 m.

A new demand has arisen for the solution mining of much thinner salt deposits because of widespread interest in the construction of storage caverns as well as the leaching out of other minerals such as potash salts. Various techniques were developed for the solution mining of deposits with thicknesses of around 40 m. In addition to single well operations, this currently also involves twin or multi-well operations, not to mention the use of horizontal drilling for various types of tunnel leaching - all with notable success.

Successful application of multi-well operations are in use by various companies. Furthermore, twin well operations have been used to great effect for the hot solution mining of potash salt deposits e.g. as described in detail by GRÜSCHOW and SAALBACH [1].

The increasing accuracy of horizontal drilling as well as the fact that LWD (logging-while-drilling) techniques allow the well path to be steered along (i.e. within) the deposit, have led to the use of this method for solution mining. Recommendations for the adaptation of this technique are reported by HENDERSON [2], SABERIAN [3], ROSAR and DAY [4], DICKINSON and DICKINSON [5], and THOMS and GEHLE [6].

In cases where the thickness of the deposit reduces to approx. 4 m, it becomes clear that the thinness of the deposit severely constrains the effectiveness of single and twin well technology. Thin deposits cannot be economically mined using single vertical well methods. Moreover, the steeper the dip, the more the situation becomes aggravated because the recoverable volumes of salt extractable per well become less and less. This is attributable to the increasing angle formed by the intersection of the horizontally aligned solution mined cavity and the dipping salt bed.

High recovery factors in beds as thin as 4 m require the further development of the existing ideas and practical experience involving the solution mining of tunnel caverns using horizontal drilling technology. The current state-of-the-art at KBB will

be presented and opened for discussion on the basis of the specific plans for the solution mining of a sylvinite deposit.

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