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Optimizing strategies for brine production as a result of salt plant modernization – a case example

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Abstract

The aim of this paper is to show a set of measures performed at Salinen Austria to avoid slipping into a situation of brine undersupply of the salt plant. After several modernization steps or an increase of production capacities at the plant the danger of having not enough resources on the brine production side, became evident.

Modifications of a salt plant are in most cases clearly design-, plan- and predictable in terms of later production capacities and take a limited range of time. They easily can be described by a step function of production capacity vs. time and during implementation all measures can be clearly monitored following this function.

Besides that, the later needed amount of brine must be evaluated early enough as the dissolution velocity of salt in water is +/- constant and as it is given by nature, very hard to influence. This fact, accompanied by other nature given factors, like changes in the geological models or the occurrence of larger blocks of insolubles inside caverns can lead quite easily to a situation where plant production capacities exceed the maximum capacity of brine supply.

Facing such a situation, investing in new caverns is not the only possible solution to the problem. As building and development of a cavern is quite time consuming and can take several years, other options have to be developed. In respect of the relatively low salt contents of Salinen Austria´s deposits averaging 55 vol. % NaCl, the increase of brine production by drilling new caverns follows a very flat ramp and lead to a plateau of maximum production capacity after approx. 10 to 20 years.

To avoid this situation of brine under supply of the salt plant the first measure was the successful test and the rapidly following implementation of an advanced solution mining concept for fully developed caverns.

As a second step the whole set of rock mechanical design models for the existing brine fields have been brought to a state of the art level. As a result of modern computer calculation capacities finite element models of whole cavern fields have been generated and they now guarantee optimized monitoring and maximum productivity of the cavern fields.

As a third step the total brine saturation, supplying the salt production plant was slightly reduced to enable faster development of younger caverns and optimized salt extraction.

Key words: Austria, Salt Production, Solution Mining, Cavern Survey, Rock Mechanics, Computer Modeling, Haselgebirge