

SOLUTION MINING OF UNDERGROUND STORAGE IN ROCK SALT BEDS OF LIMITED THICKNESS: EXPERIENCE AND COMPUTER SIMULATION

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ABSTRACT

Some salt-bearing basins represent bedded salt deposits. The salt beds, usually with a thickness of 15-20 to 40-60 m, are often separated with insoluble interlayers, mainly of anhydrites and dolomites, a few meters in thickness. The construction of underground storage under these conditions has some peculiarities.

This paper discusses Podzemgazprom's experience in solution mining of caverns in rock salt of limited thickness. The thin salt beds required to conduct solution mining by steps 5-6 to 10 m in height. In the case of such a height along with the developed roof the fresh water penetrated partly into the brine tubing string at a water injection rate of 80-90 m/h, as evidenced by a slight increase in the outlet brine concentration. This effect restricted the fresh water flow during solution mining and thereby prolonged the construction time.

The development of cavern under such conditions was simulated by computer codes SALGAS (SMRI) and RSDUGI (Podzemgazprom). The simulation showed that at a cavern height comparable with its diameter it is necessary to take into account the spatial nature of water and brine movement inside the cavern. In this case not only vertical, but also horizontal stratification of brine take place, which affects the cavern formation. The SALGAS code considers only the vertical stratification of brine. Therefore, the code must be modified to simulate caverns in thin salt beds. The results obtained in simulating cavern development by the SALGAS and RSDUGI codes are presented.