

LONG-TERM DETERIORATION OF OVERBURDEN FORMATIONS
ABOVE SOLUTION CAVERNS AND MINE OPENINGS

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1.0 INTRODUCTION

Roof formations are found to be generally stable over an isolated solution cavern in salt. This finding was made from the relationship between solution cavern and underground mine openings, which were analyzed by using the REM computer simulation models. The solution cavern used for this analysis is the 120-ft wide saucer-shaped solution cavern (Cavern #3) of Bryan Mound salt dome, and the results of this analysis were reported at the previous SMRI meeting of November, 1981 (1). The profile and plan of the cavern are shown in Figs. 1 and 2, respectively.

In continuing the above analysis, we found that the stability of the roof formation over the solution cavern is affected mainly by three basic factors: geological stratification, surrounding extraction, and cavern aging. The most important consideration for roof stability is the safety of the well casing, which could be damaged by creep deterioration of the formations. Cavern #3 of Bryan Mound was put out of operation by damage to the well casing, although the cavern itself was proven to be structurally competent.

The objective of this paper is to analyze the mechanism of roof deterioration in relation to the three basic factors, geological stratification, surrounding extraction and cavern aging. The analysis was done by using REM computer models based on field data obtained from underground mine openings. The results of this analysis lead to consideration of protective measures for the well casing.

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