

SOLUTION MINING RESEARCH INSTITUTE

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MEETING
PAPER



INTERPRETING AND PROJECTING
LONG-TERM ENVIRONMENTAL CONDITIONS
IN A SHALLOW BRINE FIELD

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ABSTRACT

The approximately 600-acre Tully Brine Field, located about 15 miles south of Syracuse in Onondaga County, New York, was operated from 1888 to 1986 by the Solvay Process Company and its successor, the present Allied-Signal Inc. During that period, approximately 31,000 acre-feet of salt (halite) was mined from the Syracuse Formation of the Salina Group at depths of 1,100 to 1,400 feet below the surface through the use of several solution-mining techniques.

The land surface in the brine field area has undergone significant general subsidence (as much as 30 feet) and has developed localized sinkholes as deep as 80 feet.

The occurrence of such settlements raised concerns regarding the effects of the subsurface deformation on regionally-recognized aquifers in the formations above the brine cavities and the possibility of continuing surface settlements in and around the brine field.

Based on a thorough review of drilling and operation records, the results of several level surveys (made mostly since the mid-1950s), and the results of chemical analyses of waters from the brine wells, local domestic supply wells, natural springs, and a few groundwater monitoring wells, the authors reached the following conclusions:

- The brine field had undergone approximately 9,000 acre-feet of surface settlement,
- Bulking of the overlying rock and the presence of uncollapsed solution cavities account for the remainder of the mined-salt volume,
- The rate of surface subsidence has slowed considerably since the mining ceased and is expected to become even more diminished in the future,
- Standing waters in the inactive brine wells have "freshened" since the wells were taken out of production, and
- Groundwaters in the recognized aquifers overlying the mined areas have dissolved solids concentrations consistent with those in the same aquifers elsewhere in the region.

The authors describe the methods by which they gathered and interpreted the voluminous records in developing an understanding and rational prediction of the existing and future geologic conditions in the brine field and its environs.