

**AAPG Annual Convention  
Salt Lake City, Utah  
May 11-14, 2003**

Govert J.A. Buijs and Robert H. Goldstein, University of Kansas, Lawrence, KS

**Salinity-Driven Fluid Flow Controls Thermal and Diagenetic History, Pennsylvanian-Permian, Western Kansas**

In Pennsylvanian-Permian carbonates of western Kansas, cloudy, replacive and void-filling dolomite can be found spanning 1300 feet of section, becoming most common upsection below Permian evaporites, a potential source of low-temperature brines. This dolomite post-dates compaction, indicating its formation after at least some burial, and an origin not associated with early processes near the sediment-water interface or at cycle boundaries.

The fluid inclusions in the dolomite typically are 4-10 $\mu$ m in size and are distributed with a diverging, fir-tree-like pattern. With back-scattered electron imaging, the inclusions correlate with dark areas that appear to cut across a brighter dolomite. This indicates that most fluid inclusions were entrapped during recrystallization of the dolomite. Homogenization temperatures ( $T_h$ ) of fluid inclusion assemblages show wide ranges from 80°C to greater than 140°C, indicating possible reequilibration. Reequilibration of fluid inclusions in dolomite commonly is caused by hydrothermal or burial heating of fluid inclusions beyond their entrapment temperature.  $T_m$  ice data from the inclusions with the lowest  $T_h$  indicate a down-section trend of decreasing salinity (from 25-15 wt% NaCl eq.), perhaps indicating an unstable salinity gradient at the time of dolomite recrystallization induced by surface-generated brines during deposition of Permian evaporites.  $T_m$  ice data from higher  $T_h$  inclusions preserve intermediate salinities, suggesting reequilibration of fluid inclusions during increasing temperature. This thermal event may have been generated by basinwide overturn and mixing induced by the sinking of surficial brines. Similar sinking of surficial brines may have been common drives for hydrothermal circulation in other sedimentary basins.