OIL MIGRATION

Structurally, the Salina Basin is in a "shadow zone" for oil migrating northward long-distances out of the Anadarko Basin in Oklahoma (see Walters, 1958; Price, 1980; Gerhard, 2004). Numerous accumulations of oil, such as the Lindsborg and Voshell fields, occur in the southern part of the Salina Basin. Smaller fields occur farther north, such as the Ash Grove and Bonaccord NE fields, located on the Abilene Anticline on the eastern flank of the basin. Gerhard (2004) suggests that oil migrating north to the southern margin of the Salina Basin could be shunted along these fractures to reservoirs on the Nemaha and Central Kansas Uplifts.



OIL IN THE SALINA BASIN

Newell and Hatch (2000) characterized three geochemically distinct oil groups that are produced from fields along the axis of the Forest City Basin and the southern end of the Salina Basin. Group 1 oils ("Ordovician-type oils") (see A at right) are produced from the Ordovician Simpson Group, the overlying Viola Limestone, and Silurian-Devonian "Hunton" carbonates in several fields. Gas-chromatographic characteristics include a relative abundance of *n*-alkanes with carbon numbers less than 20, a predominance of odd-numbered *n*-alkanes between C10 and C20, and relatively small amounts of branched and cyclic alkanes (e.g., mean pristane/nC17 = 0.07) (Martin and others, 1964; Reed and others, 1986). Group 2 oils (see B at right) are characteristic of production from Mississppian strata and reservoirs along the basal Pennsylvanian unconformity (Hatch and others, 1987). Group 3 oils (see C at right) are from the Pennsylvanian-age Kansas City Group in a single field -- the Davis Ranch field in Wabaunsee County along the axis of the Forest City Basin.





(from Newell and Hatch, 200

"Ordovician-type oils" are derived from the algae G. Prisca (Martin and others, 1964; Reed and others, 1986). They are found in several fields at the southern end of the Salina Basin and northern Sedgwick Basin. The map at right shows localities where these oils have been found or inferred.

The purest Ordovician-Type oils are found where the Ordovician reservoirs are not in contact (either by subcrop or fault) with Devonian and younger formations. If they are in contact with these types of units, then a mixed Devonian and Ordovician oil results.





This structural cross-section is drawn along the prominent fault off the west flank of the McPherson Anticline, which holds several structural traps along its crest at the southern end of the Salina Basin. The oil in these fields appears to have migrated northward by a "fill-and-spill" mechanism (see Gussow, 1954), and possibly from local source beds on the downthrown side of the fault. The northward limit of the oil that migrated up this anticline is the cross-fault on the north flank of the McPherson Field. Oil north of this fault, reservoired in the Reuben and Bonaville fields, is an Ordovician-type oil (see this panel), likely generated in place and migrated only a short distance, if at all.





The Salina Basin is buried to a depth comparable to the Forest City Basin. API gravities of "Ordovician-type oils" in both basins increase with depth. At comparable depths, these oils in the Salina Basin appear to have slightly higher API gravities than in the Forest City Basin. This may be a manifestation of slightly higher maturation in the Salina Basin.

