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 Great City trend 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 Visto Limestone, and the Karoo–Devonian “Huntont” carbonates in several fields. Gas chromatographic characteristics include a relative abundance of nalkanes with carbon numbers less than 23, a predominance of odd-numbered alkane isomers in solution between C16 and C20, and relatively small amounts of branched and cyclic alkanes (e.g., mean pristane/phytane < 0.17) (Marlin et al., 1994; Hood and others, 1995). Group 2 oils (see B at right) are characteristic of production from Mississippian 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 Darcy Ranch field in Wabaunsee County along the axis of the Forest City Basin.

“Ordovician-type oils” are derived from the algae of the Mississippian (Martian and others, 1904; Hatch and others, 1995). They are found in several fields at the southern end of the Salina basin and in the eastern Salina basin. The map at right shows locations where these oils have been found or inferred.

The purplish Ordovician 1-type oils are found where the Ordovician reservoirs are not in contact (either by subsidence or fault) with Devonian or younger formations. If they are in contact with those types of units, then a mixed Devonian and Ordovician oil results.

LOCATION OF ORDOVICIAN-TYPE OIL

The Salina Basin is bounded to the east and south by the Forest City Fault, and to the west and north by the Twin Forks Fault. The Ordovician-type oils are found primarily in the eastern and southern portions of the Salina basin. The occurrence of Ordovician-type oils in both basins is described in detail in the text. The map at right shows the locations where these oils have been found or inferred.

CROSS-SECTION ALONG FAULT PLANE FLANKING THE MCPHERSON ANTICLINE

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 Lassaw, 1934), and possibly from the eastern source rocks 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, preserved in the Reuben and Bonnville fields, is an Ordovician-type oil (see this panel), likely generated in place and migrated only a short distance, if at all.

STRUCTURE MAP

BASE MIDDLE ORDOVICIAN SIMPSON GROUP

STRUCTURE MAP

FIELDS IN VOSHELL TRENDS

SIMPSON STRUCTURE VOSHELL TRENDS

- Newell and Hatch (2000) characterized three geochemically distinct oil groups that are produced from fields along the axis of the Great City trend 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 Visto Limestone, and the Karoo–Devonian “Huntont” carbonates in several fields. Gas chromatographic characteristics include a relative abundance of nalkanes with carbon numbers less than 23, a predominance of odd-numbered alkane isomers in solution between C16 and C20, and relatively small amounts of branched and cyclic alkanes (e.g., mean pristane/phytane < 0.17) (Marlin et al., 1994; Hood and others, 1995). Group 2 oils (see B at right) are characteristic of production from Mississippian 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 Darcy Ranch field in Wabaunsee County along the axis of the Forest City Basin.

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