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## **Shallow Gas Systems in Tight Reservoirs on Basin Margins**

Shallow gas accumulations in tight reservoirs on basin margins fall into three distinct systems: early generation biogenic, late generation biogenic, and nonassociated thermogenic. Fields tend to be large (50-100 sq mi), shallow (<2000-3000 ft) and have relatively low cumulative production (1-2 BCF/sq mi). Each system has a representative archetype with distinctive attributes and characteristic gas compositions.

The southeastern margin of the Alberta basin has early generation biogenic gas in Cretaceous, marine clastic reservoirs. Reservoirs and source rocks are interbedded; gas has not migrated significantly since generation shortly after deposition. Gas is methane-rich with microbial isotopic signatures. Fields tend to be underpressured and have little co-produced water.

The northern margin of the Michigan basin has late generation biogenic methane in fractured Antrim Shale (Devonian). The marine black shale acts as both reservoir and source rock; gas migration is minimal. The gas was generated in the recent geologic past and is in relatively young water that is flowing down the basin margin, away from subcrops beneath glacial drift. Fields are usually near hydrostatic pressure and large quantities of water are co-produced.

The northwestern margin of the Anadarko basin has nonassociated thermogenic gas produced from heterogeneous Permian rocks in the Hugoton embayment. Reservoirs on the basin margin are widely separated from the areas of thermogenesis in the deeper basin. Gas has migrated substantial distances up the basin margin and contains the heavier hydrocarbons characteristic of thermogenic gas. In addition, the gas has significant amounts of nitrogen that may be an indication of ground water transport. There is, however, essentially no co-produced water with the gas.