ABSTRACT

"FROZEN-IN" HYDROCARBON ACCUMULATIONS OR DIAGENETIC TRAPS-EXPLORATION TARGETS[1]

By:
H. Hugh Wilson
Vanguard Exploration Company
Covington, Louisiana

Porosity and permeability of clastic and carbonate reservoir rocks are reduced progressively during burial by plugging of pores with secondary, pressure-dependent, diagenetically derived cements. The depth at which all effective porosity and permeability is lost in water-bearing reservoir rocks varies according to their mineral content. The presence of hydrocarbons in a reservoir inhibits the process of diagenetic plugging with the result that porosities and permeabilities differ greatly above and below an oil/water contact.

This difference in diagenetic evolution within and outside the oil column indicates early emplacement of oil in a trap. Furthermore, diagenetic plugging inhibits the entry of any later generated oil and makes the lateral flushing of oil from a trap progressively more difficult with burial.

When diagenetic plugging below a hydrocarbon paleotrap is complete, the accumulation is sealed in, and deeper burial with attendant pressure and temperature increases results in natural cracking of trapped oil to gas with phase-change expansion causing geopressuring of the depletion-type reservoir.

When a diagenetically sealed trap is later tilted regionally or locally the accumulation will be held in place despite its unfavorable structural position. Such diachronous traps are designated "diagenetic" as opposed to "structural" or "stratigraphic".

Effective search for diagenetic traps requires careful paleostructural analyses coupled with documentation of diagenetic porosity-destruction sequences for each objective reservoir rock during burial.

Because of the lack of present-day structural or primary stratigraphic closure and the unconventional nature of the trapping concept, there probably are many diagenetically trapped hydrocarbon accumulations yet to be discovered, particularly in deeper basin positions.

[1]AAPG Bulletin, April, 1977, Volume 61, Number 4.