SMACKOVER STRATIGRAPHIC TRAPS - NEW PRODUCTION IN "OLD" AREAS

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ABSTRACT

Until recently, most of the Smackover exploration has been essentially a search for closed structures. This initial phase of exploration has been quite successful, and many excellent fields have been found throughout the fairway. However, in mature areas, such as Southern Arkansas and Northern Louisiana, this quest for structure has resulted in the drilling of most of the easily definable closures, and the future promised only prospects of ever diminishing size and economic potential.

With the increasing well control, however, stratigraphy has progressively been recognized as an important factor in the entrapment of Smackover hydrocarbons, even in fields generally considered to be essentially structural accumulations. An awareness of the importance of stratigraphic factors in entrapment has been dramatically focussed by the discovery of Walker Creek and Welcome Fields, Lafayette and Columbia Counties, Arkansas. Both of these fields are due to stratigraphic entrapment provided by the updip termination of porous Smackover beds across gentle structural noses. Their discovery signals the beginning of the second phase of Smackover exploration – the search for combination structural-stratigraphic and wholly stratigraphic traps – and the rebirth of exploration for large reserves in a mature segment of the Smackover Fairway.

The regionally regressive depositional character of the Smackover in this area afforded an excellent setting for the formation of many stratigraphic traps. Porous carbonate zones, successively higher within the Smackover section, were deposited southward across the shelf. The updip terminus of each zone abuts an impermeable seal to form an ideal stratigraphic trap. The sinuous nature of the updip terminus frequently, but not necessarily, in conjunction with low relief structural noses or closures entraps the hydrocarbon accumulation laterally. In addition, many variations in the regional situation, due to the local depositional patterns of individual zones, tend to complicate the simple stratigraphic trap.

Lithologically, the most characteristic reservoir rock type is an oolitic-pelletal limestone with intergranular porosity. Porosity up to 30% is not unusual, but average porosity ranges from 10-20%. Various degrees of porosity destruction have resulted from the infilling of the primary porosity with sparry calcite cement. Where wave action was not sufficient to winnow out lime muds, no primary porosity was developed.

The diverse nature of the stratigraphic traps opens up unlimited exploration opportunity on acreage once considered worthless because it was not located on closed structures. The stratigraphic phase of exploration now promises to be as profitable as was the structural phase in this "old" producing area.

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DIGITAL WELL LOGS + DIGITAL COMPUTER = A NEW PRACTICAL EXPLORATION TOOL IN THE FRIO TREND

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ABSTRACT

Petrophysical analysis utilizing digital-log information has recently become a recognized tool in the search for oil and gas. Until now, this method has not been widely used in exploration programs, due to the unavailability of a mass of accurate, inexpensive digital-well-log data and adequate computer software to completely analyze the data.

These data and analysis capabilities are now available to the oil industry and can be readily used in modern petroleum exploration programs.

Results from computer analysis of digital logs from many wells can develop leads for exploration trends, locate possible by-passed hydrocarbon bearing areas, and better indicate productive horizons within a well.

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