MEETINGS

HGS DINNER MEETING—APRIL 9, 1990

NOEL TYLER—Biographical Sketch

Noel Tyler is Program Coordinator for Oil Recovery Research at the Bureau of Economic Geology, and lecturer in Geological Sciences at The University of Texas at Austin. Noel joined the Bureau in 1981 after receiving his PhD from Colorado State University. For the past nine years he has been working on developing models of reservoir architecture in a variety of reservoir types, and evaluating their utility in predicting fluid flow and the location and volumes of unrecovered hydrocarbons. He has published several papers on this subject and is active in teaching continuing education courses in the field of reservoir characterization. Noel was recently named Director of the new Center for State Lands Energy Resource Optimization, a research consortium of state universities, headquartered at the University of Texas at Austin.

RESERVOIR ARCHITECTURAL STYLES AND RECOVERY RESPONSE

Ultimate recovery from Texas oil reservoirs at current technological and development levels is projected to be 36 percent of the oil in place. Thus, of the 165 billion barrels (Bbbl) of oil discovered statewide, 106 Bbbl will remain in existing reservoirs after recovery of proved reserves. This remaining resource is composed of residual oil (71 Bbbl) and mobile oil (35 Bbbl). The remaining mobil oil is conventionally recoverable but is prevented from migrating to the well bore by intrareservoir seals or bounding surfaces.

Reservoir architecture, the internal fabric or structure of reservoirs, governs paths of fluid migration during oil and gas production. Reservoir architecture is, in turn, the product of the depositional and diagenetic processes responsible for the origin of the reservoir. Therefore, if an understanding of the origin of the reservoir is developed, reservoir architecture, and hence, the paths of fluid migration, become predictable. Thus, with greater understanding of the fabric of the reservoir and its inherent control on the paths of fluid flow, we can more efficiently design and implement advanced recovery strategies.

Reservoirs can be assigned to a relatively small number of depositional systems. These depositional systems, and their component facies, are characterized according to varying degrees of lateral and vertical heterogeneity. For example, fluvial-dominated deltas display a high degree of lateral heterogeneity; in contrast, wave-dominated deltas are characterized by very low lateral heterogeneity. Highly stratified restricted-platform carbonate reservoirs in the Permian Basin contrast with Gulf Coast strandplain sandstones that are relatively simple in vertical character.

Reservoirs of different depositional origins can therefore be categorized into a "heterogeneity matrix" on the basis of varying intensity of vertical and lateral heterogeneity. The utility of the matrix is that it allows prediction of the nature and location of remaining mobile oil. Highly stratified reservoirs, for example, will contain a large proportion of bypassed oil; thus, an appropriate recovery strategy will be waterflood redesign and profile modification. Laterally heterogeneous reservoirs would benefit from targeted infill drilling and, possibly, horizontal wells. Potential for advanced recovery of remaining mobile oil through heterogeneity-based recovery strategies in Texas is projected to be an incremental 16 Bbbl. In the lower 48 states this target may be as much as 45 billion barrels (AAPG, 1989).