JURASSIC GEOLOGY AND HYDROCARBON POTENTIAL OF SOUTHWESTERN ALABAMA

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ABSTRACT

The Jurassic Haynesville-Buckner-Smackover-Norphlet sequence in southwestern Alabama includes excellent deep reservoirs and laterally equivalent source rocks. The complex interaction of stratigraphy, syndepositional salt tectonics and faulting, and draping due to differential compaction over basement structures provides mechanisms for early entrapment of and potentially significant hydrocarbon reserves in this area. Major Smackover-Norphlet production to the northwest and northeast, at Hatters Pond, Chunchula and Jay fields, is from facies similar to those found in southwestern Baldwin County, Alabama. Detailed petrographic analyses of cores, chips, and cuttings samples from seven wells in southern Alabama and western Florida provide data for conceptualizing Upper Jurassic stratigraphy (Norphlet-lower Haynesville) and paleofacies relationships in this area.

The development of a regional Triassic Eagle Mills paleotopography in this area, including the interior salt basin, was influenced by existing Paleozoic basement structural trends and tensional tectonism related to incipient opening of the ancestral Gulf of Mexico. In the easternmost portion of the salt basin, deposition of the Werner Anhydrite and Louann Salt was succeeded by the southward progradation of fluvial lower Norphlet facies. Upper Norphlet facies include littoral and possibly eolian sandstones, which are among the oldest Jurassic hydrocarbon reservoirs in the region. Rapid inundation of the Norphlet surface in lower Smackover time resulted in the deposition of "basinal" argillaceous carbnates (brown dense facies) in the area. This event was followed by the establishment and progressive southward progradation of a shoal-water limestone facies mosaic, including high-energy grainstones. Many of these subsequently dolomitized grainstones have porosities of as much as 24% and good permeabilities despite their burial below 19,000 ft in southern Baldwin County. However, commercial hydrocarbon production from such reservirs has not yet been extended south into this area.

Evaporitic sabkha facies of the uppermost Smackover and Buckner-lower Haynesville subsequently prograded over shelf carbonates throughout most of the study area. Whereas the area south of the Baldwin County graben generally appears to have remained basinal in character throughout all of Smackover time, Buckner-lower Haynesville deposits in the Amoco No. 2 Amos well in T-7-S R-4-E Sec 32 include thick grainstone shoal deposits which indicate the local existence of an emerging positive area south of the graben. This facies could provide for significant stratigraphic-structural hydrocarbon accumulations in this heretofore unexplored region.

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