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Discovery of Ring Faults Associated with Salt Withdrawal Basins of Early Cretaceous Age in the East Texas Basin

Abstract

The Jurassic Louann salt in the East Texas basin has played a dominant role in influencing the structural and depositional history of the basin, particularly during the Jurassic and Cretaceous periods. Salt tectonics is closely associated with sandstone distribution, depositional facies, and reef growth, and consequently, with petroleum traps in the basin. Salt withdrawal basins, developed during the Early Cretaceous in response to salt movement and dissolution processes, are characterized by the presence of an expanded section of Lower Cretaceous marine and deltaic sedimentary rocks. Recognition of fault sets associated with the evolution of these salt-withdrawal basins has gone undetected until the recent Coherence Cube™ processing of a non-proprietary 3D seismic survey conducted by Schlumberger in the La Rue dome Fairway field area, Henderson County, Texas.

Images from Coherence Cube™ processing aptly exhibit extraordinary sets of concentric ring faults that comprise the periphery of two salt withdrawal basins. The Fairway oil field is located at the junction of these two sets of ring faults. The structural style of these high-angle ring faults creates a multitude of possible fault traps in a previously unattractive structural setting. Early Cretaceous age of the ring faults establishes that these faults are a significant element in evaluating petroleum migration patterns and traps in the basin. The discovery of Early Cretaceous ring faults in the East Texas basin by Coherence Cube™ processing brings new perspectives to development and exploration drilling in this mature petroleum province.

Biographical Sketch

STEVEN J. MAIONE, senior geophysicist for Scott Pickford, a Core Laboratories Company, received degrees in geological engineering and Masters in geology from the Colorado School of Mines. He joined Union Oil Company of California as a geologist in Casper, Wyoming. In 1974 he was recruited to join Unocal's geothermal division and participated in geothermal exploration projects in North America, Philippines, Indonesia and Japan. In 1992 he transferred to Unocal's Sugar Land, Texas, worldwide exploration division office and joined teams assessing new venture opportunities in North America and eastern China. In 1997, Steve became an associate of Valenti Engineering Services of Kingwood, Texas, where he specialized in 3D seismic interpretation, participating in projects in eastern China and Venezuela. In 1998 he joined Coherence Technology Company (CTC) in Houston as senior geophysicist in the seismic interpretation services group. At CTC, and later with Scott Pickford, he has had an opportunity to interpret numerous 3D surveys, including offshore Nigeria, eastern Saudi Arabia, Anadarko basin, East Texas basin, Texas Gulf Coast, and Mexico. His position has also permitted him to assist numerous corporate exploration staffs in utilizing Coherence Cube™ processing in achieving successful 3D interpretations.

Steve is a member of the American Association of Petroleum Geologists, the Houston Geological and Geophysical Societies, the Society of Exploration Geophysicists, the Geological Society of America, Sigma Xi, and the Rocky Mountain Association of Geologists. □