Geopressure Compartmentalization in Salt Basins: Assessment for Hydrocarbon Entrapments in the Gulf of Mexico

Selim S. Shaker

Geopressure Analysis Services (G.A.S.), 1510 Village Green Ct., Houston, TX 77077

ABSTRACT

The complex interaction between salt and surrounding sediments makes risk assessment of a prospect or play concept a challenge. Pore pressure compartmentalization in the Gulf of Mexico Tertiary-Quaternary salt basins is created mainly by the principle stresses resulting from interaction between the sediment load and tectonic movement of salt.

The unique petrophysical properties of salt contribute to changes in the structural setting and affect the sealing capacity and hydrocarbon retention capability of traps. The low density of salt may retard the sealing capacity in subsalt sediments, while enhancing the seal capacity in supra-salt sediments. Because salt is relatively impermeable, its contact with surrounding sediments forms a barrier to hydrocarbon movement. The integrity of the sealing interface is usually impacted by the salt tectonic history.

The ductile nature of salt creates different forms of salt tectonics, such as diapirs, ridges, salt withdrawal basins, overhangs, canopies, *etc*., that have a direct impact on stress orientation. Establishing the predicted pore pressure in the impermeable beds (shale) compared to the measured pressure in the reservoir facies (sands), plays an important role in assessing the entrapment and sealing capacity of traps. In this study, wells were analyzed from several different salt tectonic settings in the Garden Banks, Mississippi Canyon, and Green Canyon protraction areas.

While a great deal is known about salt body delineation from geological and geophysical data, this paper addresses salt-related hydrocarbon traps from a formation pressure standpoint.

Shaker, S. S., 2006, Geopressure compartmentalization in salt basins: Assessment for hydrocarbon entrapments in the Gulf of Mexico: Gulf Coast Association of Geological Societies Transactions, v. 56, p. 771. A full-length manuscript is available as part of the 2005 GCAGS Transactions, v. 55 (New Orleans), p. 742-755.