

The Sakarn Series: A Potential New Hydrocarbon Play within a Louann-Norphlet-Age Stratigraphic Interval at the Border of the Eastern Gulf of Mexico

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Abstract

The Norphlet is a major Aeolian sandstone reservoir in deepwater Eastern Gulf of Mexico. Extending regional mapping of this reservoir to the south east of its core area around Appomattox and Ballymore bring evidence of a stratigraphic series up to 2,500 meters (~8,000 feet) thick between well-calibrated Base Smackover and Base of Salt. We refer to this newly recognized, unpenetrated interval as the Sakarn Series. Its absolute age is unknown but is bracketed by younger Oxfordian age Smackover Formation and older Louann Salt. The Louann Salt is classically attributed to be Callovian in age but recent work suggests the onset of Louann Salt deposition could be Bathonian (170.3Ma to 168.3Ma), indicated by recent and historical strontium isotopic analytical data. The thick Sakarn Series and its seismic layering indicate a potential significant time period of deposition consistent with a longer duration of Louann salt deposition implying the current understanding of Middle-Upper Jurassic stratigraphic evolution of the EGOM may need to be revisited. The Sakarn Series is mapped via 3D seismic volumes primarily in the Lloyd Ridge Outer Continental Shelf (OCS) protraction area. Sakarn Basins in this area are limited by abrupt lateral termination of the Sakarn Series at major structural features; either normal or transform faults. These structural limits were important lineaments during the early opening phase of the Gulf of Mexico Basin in the Middle and Late Jurassic and control the present day distribution of the Sakarn Series. Regional paleo-context of the Sakarn Series places its deposition

in an extremely dry climate in low-mid latitudes indicated by Louann evaporites and aeolian-fluvial and partially evaporitic series of the Norphlet Formation. The seismic character of the series exhibits multiple frequency contrasts and several high velocity intervals. Anhydrite, carbonates, shales and siliciclastic are all possible given these seismic attributes. The Sakarn Series may have all the ingredients of a self-contained hydrocarbon system. A revised stratigraphic chart and paleogeographic evolution of the Middle Jurassic is proposed to integrate the Sakarn Series with a tentative and broad age bracket within the Bathonian to perhaps earliest Oxfordian including a 9 m.y. period of Louann through Norphlet deposition; a total time period of up to 9 m.y.