The Depositional Environment of the Eocene Singer Sand in Southwestern Beauregard Parish, Louisiana

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ABSTRACT

The Cockfield stratigraphy in southwestern Louisiana originated from landward deltas feeding into a marine environment influenced by fluctuating sea levels. The Cockfield in the study area of Beauregard Parish is 1500 ft thick. This thickness represents many sequences of sedimentation from shallow marine to outer neritic. The prime task was to determine the depositional environment of a single sand, locally known as the Singer Sand. The study area in Beauregard Parish was comprised of three oil fields. An elongated Singer sand body trending north-south is easily observed in the subsurface and on seismic. The areal extent of the sand is limited giving the appearance of an elongated narrow bar sand.

An interpretation of geological and geophysical data was completed for the Eocene Singer Sand in southwest Beauregard Parish. The Singer Sand is a member of the Cockfield Formation. In this study, the structure and stratigraphy of the Singer Sand was determined through the interpretation of subsurface well data and 3D prestack time migrated seismic data. The Singer Sand was interpreted where it is present within the study area. All faults in the area, both syndepositional and post-depositional, were found to be normal faults. The syndepositional faults strike parallel to the coastline and display growth on the downthrown side of the faults. The spontaneous and resistivity log responses were used to delineate the extent and thickness of the sand, as well as to help determine the depositional environment.

Seismic amplitude extraction volumes were studied to confirm the location and thickness of sands in the study area. Similarity volumes were also used to delineate the extent of the Singer Sand. Net sand maps were produced to delineate the extent and suggested depositional environment of the Singer Sand. Net sand isopach and structure maps derived from well logs were compared with equivalent maps constructed from the seismic data to confirm the interpretations and correct for discrepancies between the two types of data. Conventional core studies from a well within the study area assisted in the interpretation. Glauconite found within the shales immediately adjacent to the Singer sand body suggests an open marine environment.

The Singer Sand was interpreted to be a shelf sand bar complex based on all available data incorporated into the study. The study integrated seismic interpretations utilizing amplitude extraction and similarity volumes with all available subsurface information. Conventional core analysis confirmed the open marine environment.