Missing Stratigraphic Sections in Tertiary Sandstone Reservoirs of the Gulf Coast: Faults or Unconformities and Implications for Development Strategies

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Missing section identified by log correlation in Gulf Coast boreholes is typically interpreted as displacement by downward movement along the upper surface of a growth fault. A common interpretation strategy is to link wells containing missing section with a growth fault having a curvilinear geometry in map view. We present here an alternative possibility: section missing because of erosion. This interpretation has a very different geometry and results in alternative implications for compartmentalization in stacked sandstone/shale reservoirs.

Missing stratigraphic section in the F39 Frio reservoir of Lavaca Bay field, an Oligocene barrier/strandplain reservoir in Calhoun County, Texas, has been attributed to growth faulting. The geometry of missing sections in wells in this reservoir is complex, however, and the standard fault interpretation results in an unusual and geologically unlikely structural configuration. A dipmeter log from a key well in this reservoir indicates a sharp boundary at the depth of missing section and a distinct change in northwest dip from 8° above to 14° below. The map-view geometry of missing section defines two subcircular areas of erosion. These features are interpreted to have formed by local uplift due to shale diapirism and concomitant erosion of an overlying sandstone, which was deposited as a widespread tabular strandplain. The current structural crest of the field occurs between the two eroded paleohighs. Two wells in the present structural crest penetrated thick reservoir sandstone and have yielded approximately 20 percent of the cumulative production from this reservoir.

Distinguishing missing section caused by erosional unconformities from that caused by growth faulting has three implications for reservoir development and resource assessment: (1) compartments bounded by faults can contain sandstones of nearly uniform reservoir properties throughout, whereas compartments caused by erosion will contain thin sandstones along the margins, (2) interpreting compartment boundaries as faults will result in very different compartment shapes than would result from the unconformity interpretation, and (3) misinterpreting missing section can lead to miscorrelation of productive zones in stacked reservoirs and, thus, to incorrect estimations of remaining resources.

Depositional Environment of the Downdip Queen City (Eocene) Sandstone, Mestena Grande Field Area, Jim Hogg and Duval Counties, Texas

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The downdip Queen City sandstone interval in the Mestena Grande field area of the south Texas Gulf Coast Basin comprises two sandstone depositional units, referred to herein as A Lobe and B Lobe. A total of 583 ft (179 m) of conventional core from 11 wells containing predominantly B Lobe deposits was examined macroscopically. The A Lobe is a thin (6–34 ft; 1.8–10.4 m) fine- to very fine grained, mostly bioturbated, well-sorted sandstone. The B Lobe is composed of fine to very fine, well-sorted sandstone interbedded with siltstone and mudstone. The trace fossil assemblage of the B Lobe indicates that sediments were deposited in the *Cruziana* ichnofacies. Trace fossils and authigenic minerals also suggest oxygen stratification during deposition. The B Lobe contains five subunits, each as much as 13.5 ft (4 m) in net sandstone thickness. These units were deposited as part of a highstand systems tract during the early Lutetian Stage (early middle Eocene). The B Lobe is a primarily aggradational unit composed of storm-generated sandstone and heterolithic deposits of the lower shoreface to inner shelf environment. The A Lobe is an upward-coarsening unit that represents progradation of the shoreface during late highstand systems tract development. An interlobal mudstone, which separates the units, marks the transition from early to late highstand systems tract development.