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Lithologic, Hydrocarbon Migration, and Source Rock Implications of Condensed Sections Based on Paleoecological Studies of Fossil Taxa

Integrated sequence and biostratigraphic studies of condensed sections focus on: (1) well log patterns, (2) seismic character, (3) fossil abundance peaks, and (4) biochronology. In reservoir modeling and in regional reservoir and source rock prediction, however, it is often as important to obtain insight into the paleoecology of condensed intervals.

Fossil assemblages recorded in petroleum system condensed sections and in Quaternary condensed section analogs, support the paleoecological classification and interpretation of condensed sections. Five condensed section (CS) types are distinguished in this way: (1) marly or limey CS within expanded siliciclastics; (2) vuggy-nodular limestone CS containing hiatuses, within expanded carbonates; (3) authigenic limestone CS within expanded siliciclastics; (4) organic-rich CS within expanded siliciclastics or carbonates; and, (5) hemipelagic CS within expanded siliciclastics. Types 1, 2, and 4 encompass longer time intervals, types 3 and 5, shorter time intervals. Predicted paleoenvironmental and hydrocarbon implications for each type are: (1) marine marls with abundant and diverse planktonic and benthic taxa, epifauna dominant, inhibits vertical migration; (2) depositional/erosional carbonate hardgrounds with common relict taxa, planktonics, and epifaunal benthics, reservoir-prone karstic-vuggy character; (3) authigenic carbonate hardgrounds with common embedded epifauna, includes seep faunas, often fractured, records vertical hydrocarbon seepage, vertical migration and reservoir-prone; (4) sapropelites with abundant and diverse siliceous planktonic taxa and less common and diverse benthic and terrigenous taxa, infauna dominant, classical hydrocarbon source rock; and, (5) carbonate-rich shales with abundant and moderately diverse benthics and less abundant planktonics, epifauna dominant, may constitute flow barrier within reservoir section.