

---

---

## Eagle Ford Shale Variability: Sedimentologic Influences on Source and Reservoir Character in an Unconventional Resource Unit

William C. Dawson and William R. Almon

Chevron ETC, Houston, Texas

---

---

### ABSTRACT

The Eagle Ford Group (Cenomanian to Turonian) represents a “self-contained” petroleum system consisting of interstratified source, seal, and potential reservoir units. Eagle Ford mudstones vary from slightly to very silty, calcareous, phosphatic, pyritic, glauconitic, bentonitic and carbonaceous facies, ranging from massive to well-laminated and slightly to abundantly fossiliferous. These argillaceous facies are interstratified with siliciclastic and bioclastic sandstones and siltstones. The degree of bioturbation varies from minimal to pervasive. Source rock attributes are well-known from outcrop and subsurface studies. Total organic content (TOC) values range from 2.1 to 5.2 wt.% (mean: 3.6 wt.%). Variations in organic-matter type and organic content are correlative with high-frequency stratigraphic fluctuations. Gas-prone organic material is characteristic of silt-rich, highstand, Eagle Ford intervals. In contrast, more oil-prone organic facies occur preferentially within transgressive Eagle Ford mudstones having excellent source and seal potential.

Eagle Ford strata are currently of interest as potential reservoirs. Similar to source rock attributes, reservoir character is strongly dependent on variations in lithofacies. Interstratified siltstones and silty shales provide enhanced reservoir properties relative to clay-rich/ silt-depleted Eagle Ford shales. In particular, microporous siltstone and very fine sandstone laminae and sand-filled bioturbation structures can provide preferential pathways for lateral and vertical fluid movements. Hence, differences in detrital silt content, horizontal fabric preservation and microfracture distribution can account for considerable variability in shale reservoir properties. Interstratified carbonate laminae and nodules can form intra-reservoir baffles and seals in the absence of open fractures. An understanding of lithofacies and stratigraphic variability are essential aspects of high-grading Eagle Ford and other shale-based hydrocarbon plays.