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“Reefs” as exploration targets in the Smackover Formation

Carbonate buildups in the Smackover Formation (Jurassic) remain attractive hydrocarbon exploration targets despite decades of development. Buildups include *reefs* or *mounds*, which exhibit synoptic relief, are constructed (at least in part) by autochthonous organisms, contain distinct biotic communities, and may be ecologically zoned. Reefs contain a rigid skeletal framework whereas mounds do not. Previously unrecognized buildups continue to be discovered, and new models are being developed to explain them. Paleogeography controls the distribution of buildups, and knowledge of paleogeography leads to discovery of previously unknown buildups. Diagenesis strongly influences reservoir evolution, and diagenetic trends help explain the quality of Smackover buildup reservoirs. Depositional fabric and texture also affect reservoir quality; and, because diverse buildups grew on the Oxfordian sea floor, the resultant reservoirs are diverse as well. Most known Smackover buildups are reefs (Walker Creek Field, Arkansas) or microbial mounds (Appleton, Chunchula, Dean Creek, and West Appleton Fields) because biotrital mounds (Uriah Field) are difficult to recognize in the subsurface. Biotrital mounds are organosedimentary deposits formed (at least in part) by the autochthonous accumulation of biogenic debris. Biotrital mounds petrophysically resemble carbonate shoals (both have well connected interparticle porosity), but are distributed like microbial mounds or framework reefs. A complex of biotrital and microbial mounds occupies the crest of the 65-km-long Saint Stephens ridge in southwest Alabama.