

ORIGIN OF DOLOSTONE RESERVOIR ROCKS, SMACKOVER FORMATION (OXFORDIAN), NORTHEASTERN GULF COAST, U.S.A.

Bradford E. Prather

Shell Offshore Inc., New Orleans, LA 70161

ABSTRACT

Geochemical and petrographic data suggest that, despite the effects of recrystallization, formation of regionally extensive dolostone reservoir rocks in the Smackover can be deciphered. Dolomitization took place in (1) seawater-seepage, (2) reflux, (3) near-surface mixed-water, (4) shallow-burial mixed-water and (5) deeper-burial environments, which overlapped in time and space to form a "platform-scale" dolostone body composed of a complex mixture of dolomites (Prather, 1992a).

Seawater-seepage and reflux dolomitization occurred in near-surface environments penecontemporaneous with deposition of the Smackover and overlying Haynesville formations. Dolomitization by seawater-seepage occurred within an oolite grainstone sill which separated an intraplatform salt basin from the open sea during the Late Jurassic (Prather, 1992b). Seawater flowed landward through the sill in response to evaporitic drawdown of brines in the isolated intraplatform basin. Dolomite enriched in ^{18}O located at the top of the Smackover suggests additional dolomitization by reflux of hypersaline brines. Reflux occurred as Buckner coastal sabkhas prograded over Smackover oolite grainstone shoreface deposits.

Vugs lined with shallow-burial calcite and dolomite cements indicate flushing of the Smackover grainstone aquifer with fresh water. Fresh-water intrusion probably occurred following sea level lowstands during the Late Jurassic and Early Cretaceous. Leaching in the proximal portion of the freshwater aquifer produced excellent quality limestone reservoir rocks in the updip Smackover. Dolomitization in the contemporaneous downdip mixed connate/freshwater zone formed dolostone reservoir rocks with depleted isotopic compositions consistent with a shallow-burial mixed-water origin.

REFERENCES CITED

- Prather, B.E., 1992a, Origin of dolostone reservoir rocks, Smackover Formation (Oxfordian), northeastern Gulf Coast, U.S.A.: AAPG Bulletin, v. 76, no. 2, p. 131-163.
- Prather, B.E., 1992b, Evolution of an Late Jurassic carbonate/evaporite platform, Conecuh Embayment, northeastern Gulf Coast, U.S.A.: AAPG Bulletin, v. 76, no. 2, p. 164-190.