PROLIFIC OVERTON FIELD GAS RESERVOIRS WITHIN LARGE TRANSVERSE OOLITE SHOALS, UPPER JURASSIC HAYNESVILLE, EASTERN MARGIN OF THE EAST TEXAS BASIN

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ABSTRACT

Late Triassic rifting along a NE-SW spreading center in east Texas resulted in basement highs along the eastern margin of the East Texas Basin that became sites of extensive ooid shoal deposition during Late Jurassic time. Reservoirs within oolite facies at Overton Field contain over one trillion cubic feet of natural gas. These large shoals, each approximately 15 miles (24 km) long and 3 miles (4.8 km) wide, trend N-S as a group and NE-SW individually, oblique to the basin margin but most likely parallel to Jurassic diffracted tidal currents within the East Texas Basin embayment of the Gulf Coast. Modern Bahamian ooid shoals of similar size, trend, and depositional setting occur at the terminus of the deep Tongue-Of-The-Ocean platform reentrant. Overton Field reservoirs are in ooid grainstone shoal facies and in transitional shoal margins of skeletal-oolitic-peloidal grainstones and packstones. Adjacent nonreservoir facies are peloidal-skeletal-siliciclastic wackestones and mudstones.

Early diagenesis of grainstone reservoir facies included meteroic dissolution and grain stabilization, resulting in abundant "chalky" intraparticle porosity and equant and bladed calcite cements filling interparticle porosity. Subsequent burial diagenesis resulted in intense solution compaction and coarse equant calcite and saddle crystal dolomite that occluded remaining interparticle porosity. Whole rock trace element analysis indicates greatest diagenetic flushing (less Mg and Sr) in porous zones. Stable isotopes for grains and cements show strong overprint of later burial diagenesis, with greater depletion of $^{18}0$ in reservoir facies. However, hydrocarbons were emplaced prior to late cementation, and unlike other Jurassic Gulf Coast reservoirs, deep burial diagenesis provided no late-stage formation of porosity.

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