

**AAPG HEDBERG CONFERENCE**  
***MICROBIAL CARBONATE RESERVOIR CHARACTERIZATION***  
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**Late Jurassic Microbiolite Reservoirs of Southwestern Alabama, Little Cedar Creek Field:  
A Core Presentation**

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The microbiolite facies which occurs in the Smackover formation at Little Cedar Creek Field of Southwestern Alabama appears to extend as a continuous reservoir for at least 32 kilometers and closely parallels the Late Jurassic shore line. The width of this build-up varies from 6.4 to 0.4 kilometers in a dip direction, and commonly measures up to 20 meters in thickness. The overall paleo-environmental setting of this microbiolite deposition is one of near-shore, open marine development near the mouth of a pronounced embayment. Tidal current and wave activity may have been robust in this setting, providing abundant nutrients to the microbiolite community even within an elevated salinity system.

Excellent sampling density is provided throughout the microbiolite buildup and the surrounding area by 148 conventionally cored wells. This has allowed for an extensive petrographic look into the internal makeup of the bioherm as well as a repeated view of the overlying, underlying, and lateral stratigraphic facies relationships.

From a stratal perspective, the microbiolite sits atop a transgressive sequence of Lower Smackover laminated mudstones and bioturbated lime wackestones and packstones of a mid to inner ramp setting. In its down dip portions, the microbiolite is overlain by a lowstand deposit of carbonaceous lime wackestones and black terrestrial shales. In the up dip areas the microbiolite exhibits subtle indications of exposure and is disconformably overlain by a second sequence of laminated mudstones, bioturbated wackestones and packstones and finally capped by a regressive sequence of upper Smackover ooid and peloid grainstones and intertidal lime muds which grade upward into siliciclastic shales, sandstones and evaporites.

The Little Cedar Creek Field microbiolite hosts a varied assemblage of encrusting, columnar, and branching algal and cyanobacterial masses, serpulid worm tubes, foraminifera, bivalves, gastropods and occasional sponges (?). Intergranular, shelter, and dissolution porosity types provide excellent petrophysical parameters (up to 24% porosity and up to 2 darcies permeability) to this reservoir. Because of early marine cementation (micrite and finely bladed calcite) the microbiolite was commonly, often densely, fractured during burial. These nearly vertical fractures afford an additional aspect of reservoir continuity and hydrocarbon deliverability to the microbiolite reservoir.

The Little Cedar Creek Field complex of microbialite build-ups and overlying ooid shoal reservoirs is rapidly becoming one of the largest Smackover fields developed in the Gulf

Coast Province and may contain as much as 400,000,000 barrels of oil. Exploratory drilling activity in the field is continuing at this time, and as a result, the extent of the microbialite mass continues to expand.

Two cores from the field are presented here to exhibit, not only the internal make-up of the microbialite reservoir, but also to establish its overlying, underlying, and lateral facies and stratal relationships within the Smackover Formation.