

REGULAR EVENING MEETING

"DENKMAN SANDSTONE MEMBER (NORPHLET)- AN IMPORTANT JURASSIC RESERVOIR IN MISSISSIPPI, ALABAMA, AND FLORIDA"

By Willis W. Tyrrell, Jr.



A clean, generally well-sorted, commonly porous, sandstone unit separates marine lower Smackover carbonate mudstone above from nonmarine red beds of the Norphlet Formation below in parts of southern Mississippi, southwestern Alabama, and northwestern Florida. This sandstone unit has been called basal Smackover, Norphlet, or Denkman. The name Denkman Sandstone was proposed for this unit by Murray (1961) who designated the Lion No. 2 Denkman, Sec. 22, T7N, R4E, Rankin County, Mississippi, as the type section. The Denkman Sandstone, which locally exceeds 1000 feet in thickness, a lithologically distinct mappable unit. Nevertheless, it is included in the Norphlet Formation by the industry; and in this paper it is called the Denkman Sandstone Member of the Norphlet Formation.

The Denkman Member is overlain with little or no gradation by basal Smackover carbonates and grades downward into red beds, the more characteristic lithology of the Norphlet in the Gulf Coast Province. The Denkman changes updip into a conglomeratic facies interpreted to be alluvial fan and fluvial deposits. The Denkman consists of well-sorted, fine-to-medium grained, in part rounded and frosted, quartz grains with some feldspar, chert, and rock fragment grains. The section is characterized by thick sets of planar cross laminae. It does not contain fossils or carbonate beds and commonly has good intergranular porosity and permeability. Unlike sandstone beds in the overlying Smackover, it contains little or no carbonate cement except in its uppermost part. The intergranular cement is commonly anhydrite or silica and locally halite.

Regional distribution and stratigraphic relationships show the Denkman to be a clean sandstone facies of the Norphlet clastic wedge complex derived from north and east source areas. The vertical sequence of lithology and sedimentary structures indicate a fluvial and eolian origin for most of the Denkman sandstone. Locally, the upper few feet are marine in origin, probably the result of reworking during subsequent Smackover transgression. Except for this marine upper portion, the Denkman Member marks the end of a major Jurassic evaporite to nonmarine cycle (Werner Anhydrite - Loyann Salt - Norphlet depositional cycle). It is overlain by a more complete marine to nonmarine cycle (Smackover-Buckner-Haynesville-Cotton Valley depositional cycle).

The Denkman Member commonly has excellent reservoir properties. Porosity is locally present below depths of 20,000 feet and production has been established at South State Line Field between 17,909 and 18,279 feet. It has been found productive from Jackson, Mississippi, southeastward over a distance of 180 miles to near Pensacola, Florida. The Denkman is an oil reservoir at the Pelahatchie, Prairie Branch, Archusa Springs, East Nancy, Little Escambia Creek, Jay, Mount Carmel and Blackjack Creek Fields and a gas and condensate reservoir at Flomaton, Big Escambia Creek and South State Line Fields. It is and will continue to be an important exploration objective along the southeast part of the Jurassic trend in the Gulf Coast Province.

BIOGRAPHICAL DATA:

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