

THE PETROLEUM PROVINCE OF COASTAL MISSISSIPPI

A. John Warner
Mississippi Department of Environmental Quality
Office of Geology
Jackson, Mississippi

ABSTRACT

The Wiggins Arch, a remnant structure associated with Late Triassic-Jurassic basement tectonics, separates the prolific Mesozoic-Cenozoic petroleum-bearing sediments of the Mississippi Interior Salt Basin from contemporaneous sediments south of the Wiggins Arch in the Mississippi Gulf Coast shelf. The coastal region of Mississippi has been an anomaly in an otherwise prolific oil and gas habitat of the Northern Gulf Coast Margin. Only sporadic and sparse exploration has taken place in the region, with limited success.

Oil and gas exploration began in the coastal region of Mississippi in 1911 in southern Jackson County. The No. 1 Delamorton, Section 33, T7S-R5W, reached a depth of 3010 feet and tested the Oligocene/Miocene *Heterostegina* "reef" of the Catahoula Formation. The well tested salt water and was plugged. Sporadic exploration followed in the coastal area. The primary target during this early era of exploration was the relatively shallow Oligocene/Miocene Catahoula Formation and the underlying Oligocene Vicksburg group; however, no production was established.

Exploration efforts then turned to structure-related "traps" associated with the Hancock Ridge, a southwest spur of the Wiggins Arch. In 1955, Marshall R. Young Company drilled the Cuevas Heirs No. 1, Section 30, T9S-R15W, in southern Hancock County and established production in the Cuevas Sand of the basal Dantzler or the uppermost Washita-Fredericksburg Formation. The well was drilled on a structural high associated with the underlying Hancock Ridge. This was the first established production in the region. The Cuevas Heirs No. 1, the discovery well for Ansley Field, flowed 256 bbl. of 43 degree gravity oil per day and 1660 Mcf of gas per day from perforations from 10,841 to 10,852 feet. Development of the field resulted in production from pools in the Upper Tuscaloosa, Lower Tuscaloosa, and two separate Washita-Fredericksburg horizons. Continued exploration of the area resulted in the 1959 discovery of Kiln Field, Section 35, T7S-R15W, in southern Hancock County. Kiln Field is on the Hancock Ridge north of Ansley Field and also produces from the Cuevas Sand of the Washita-Fredericksburg Formation. In 1963, Humble Oil and Refining Company continued the exploration effort with a series of wells in southern Hancock County. In 1965, the Humble No. 1 Waveland Gas Unit, Section 22, T8S-R15W, established production from an argillaceous limestone in the Lower Cretaceous Mooringsport Formation. The well tested 30 bbl. of condensate per day and 1476 Mcf of gas per day through perforations from 13,484 to 13,490 feet. This was the discovery well for Waveland Field. Further development of the field has resulted in additional production from the Lower Cretaceous Paluxy and Washita-Fredericksburg and the Upper Jurassic Cotton Valley. The trapping mechanism at Waveland Field is a complex combination of structure and stratigraphy. A broad elongated nose drapes across the Hancock Ridge at the Washita-Fredericksburg depth. Production is also influenced stratigraphically as the porous and permeable limestone grades up into an impermeable lime mudstone.

A period of slower drilling activity in the region began in the early 1980's after the extensive development of Waveland Field. That lull in exploration activity continues today. Since 1982 only 18 wells have been drilled in the Mississippi Gulf Coast and the adjacent offshore tracts of the Mississippi Sound. Eight of those 18 were development wells in Waveland Field. Thus, only ten wildcat wells have been drilled in a roughly 4,600 square mile (12,000 km²) area.

There have been significant discoveries to the east of coastal Mississippi. Recent exploration in southwest Alabama and in its state and associated federal waters has resulted in the discovery of large gas reserves in the Jurassic Norphlet Formation. In February 1992, Chevron announced the discovery of 360 feet of Norphlet pay in Federal Block 861, Mobile Area. This block is adjacent to Mississippi-owned blocks south of Pascagoula, Mississippi. In the adjacent southwest block, Unocal tested its Norphlet discovery in Federal Block 904, Mobile Area. The well tested 97.6 MMcfd from 185 feet of pay. To date equivalent rocks in Mississippi waters have not been tested. Drilling in the Mississippi Sound and adjacent federal waters and more in-depth studies will be needed to determine the western limits of these prolific Norphlet dune fields. The discoveries of Jurassic Norphlet and Tertiary Miocene fields in southwest Alabama have generated numerous studies, some of which peripherally included the equivalent rocks in the Mississippi coastal area. Increased subsurface well data and advanced seismic and gravity data have provided new information, and the recent discoveries in southwest Alabama warrant a reexamination of the region. The large areal extent of the coastal region of Mississippi and the relatively sparse drilling of the area create a considerable opportunity for oil and gas exploration.