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JURASSIC GEOLOGY OF ALABAMA AND FLORIDA PANHANDLE

Jurassic sedimentation in the area reflects the influence of numerous Appalachian structural salients. These features include the Pensacola arch, Chattahoochee arch, Brevard anticline, and the southwest extension of the Appalachian structural front, as well as several pre-Jurassic igneous plugs. A great influx of clastic material invaded the seaward margins of these structures, obliterating recognized formation boundaries in the Late Jurassic Norphlet, Smackover, and Haynesville Formations.

An anhydrite member of the Louann Salt, previously unnamed, was found in wells from Clarke, Monroe, and Wilcox Counties. This anhydrite, the Pine Hill Member, is at the top of the Louann Salt where salt is present and reaches a maximum recognized thickness of 210 ft.

The Norphlet of Alabama is typically a red sandstone or conglomerate containing igneous pebbles, anhydrite, and minor amounts of shale. In much of the area it grades upward into a gray neritic sandstone which is believed to be equivalent to the Smackover. The Norphlet-Smackover contact in this facies cannot be distinguished but the upper gray sandstone is considered to be a good exploration target. In Choctaw and northern Washington Counties, typical Smackover and Norphlet sedimentary rocks can be recognized. In this area the oölitic facies of the upper Smackover is a major objective, with production established at Toxey and Choctaw Ridge fields.

The Tombigbee depression, a depocenter for Jurassic sediments, was so named because the axis of this low follows the Tombigbee River along the east side of Washington County. During the time of Haynesville deposition this depression received large quantities of anhydrite and salt. On the northeast along the shoreward margin of the evaporites, a shoal facies developed in a relatively narrow NW-SE trend. This facies has a major exploration potential.

Cotton Valley clastic rocks include sandstone and conglomerate typical of the Schuler facies of Mississippi. Igneous pebbles also are common. Seaward, the Dorcheat facies is present, and with it a more favorable environment for oil accumulation.

This paper is not so much a documentation of the presently recognized Jurassic sediments as it is an interpretation of the projected facies and environments based on geologic concepts. Alabama and panhandle Florida will become important areas of Jurassic production in the near future.

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PALEOCLIMATOLOGIC AND PALEOBIOLOGIC IMPLICATIONS OF LOUANN SALT DEPOSITION

On the assumption that the Louann Salt mass extends below the Gulf of Mexico basin, its volume is calculated at about 4 million km^3. If such an amount of salt is added to the volume of present ocean water, together with other post-Paleozoic salts in Africa and the Middle East, the ocean water at the close of the Paleozoic is found to be at least 20 percent saltier than that of the present. The evidence of extinction of many forms of marine life at the close of the Paleozoic probably reflects the inability of marine animals to survive in such salty waters, but it also suggests that such saltiness was not typical of Paleozoic seas and was a consequence of Permian climatic and weathering conditions.

The extraction and accumulation of the Louann Salt mass required prolonged continuance of evaporating conditions. The extensive presence of eolian sandstone in the Triassic System of North America, South America, Africa, Antarctica, Australia, and Europe indicates that desert and semiarid regions probably were far more extensive then than now, and that highly evaporative winds were the agencies affecting the return to normal oceanic salinity as the Louann Salt was deposited. In turn, surviving animal stocks were able to proliferate and fill the Jurassic seas.

It is probable that these conditions also exercised significant control in accumulation of such nonmetallic deposits as phosphates, uranium, potash, sulfur, and bauxite.

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GULF BASIN-EAST TEXAS SHELF-LOWER CRETACEOUS —AN ENVIRONMENTAL HISTORY

Analysis of the environmental history of sedimentary rock and its relation to the accumulation of oil and gas is the primary responsibility of petroleum geologists today. Environmental analysis includes all the normal tools of exploration (structure, isopach maps, lithology) plus imagination—imagination based on a comprehensive knowledge of the sedimentary rocks in the subsurface coupled with an insight into contemporary environments.

Samples and cores from approximately 100 wells dispersed evenly throughout East Texas were examined to provide the data necessary for environmental analysis of the Lower Cretaceous interval.

Lithologic characteristics of time-stratigraphic units from the Hosston-Pettet through the Ferry Lake indicate an overall transgression of environments, the upper Hosston-Pettet showing the most rapid transgression. Ferry Lake sediments are the most widespread because of continual eustatic rise of sea level. Well-defined continental, transitional, and marine environments can be mapped regionally and related to lithology and hydrocarbon production for each time-stratigraphic unit.

Environments and imagination can lead to new exploration ideas, even in a mature oil province like East Texas.

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RELATION BETWEEN INTERIOR SALT DOMES AND BASIN MORPHOLOGY

The salt domes which extend from the Perry County basin to the North Louisiana syncline (Interior Salt basin) are believed by some to occupy this position because they are in a salt basin separate from those of the coastal area; others believe that the movement of the interior salt domes began earlier than the movement of those along the coast. All salt-dome movement is thought to take place where sediments overlying the salt are thickest or perhaps where the Louann Salt is thickest. This paper shows that a definite pattern of distribution exists and that this pattern is influenced by the shape and structure of the basin occupied by the interior salt domes.