terdisciplinary approaches. Linkages, mathematical models, graphic techniques, file management, and the functional orientation of the professional are important. It is necessary for the geological integrationist to reach conclusions vital to industry, government, and education.

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SALT TECTONICS AS RELATED TO SEVERAL SMACKOVER FIELDS ALONG NORTHEAST RIM OF GULF OF MEXICO BASIN

Recent exploration activity in the Smackover trend along the northeastern part of the Mississippi Salt basin has provided much new information for the interpretation of salt-formed structures. The study area is Clarke and Wayne Counties, Mississippi, and Choctaw County, Alabama. Improved seismic techniques and much new well control on the Louann Salt provide data to group structure types.

All structures studied are the result of salt flowage, and structural types are correlative primarily with amount of salt available to the structure from the mother salt bed.

Four principal categories are recognized in the area studied. These are, progressing from thinnest salt along the rim of the basin to thicker salt basinward:

1. *Periphery salt ridges.*—Around the periphery of the Mississippi Salt basin, the Louann Salt wedges out against an older Paleozoic shoreline. With subsidence of the basin after deposition of the salt, differential forces were created which caused flowage of the salt toward the wedgeout. This has produced a series of salt ridges along the updip limit of the salt. Stresses caused in overlying beds by this salt flowage resulted in a complex system of graben faulting in shallower beds. Such faults generally parallel the updip limit of the Louann Salt (the Pickens-Gilbertown-Pollard fault system). The salt thickness at the apex of peripheral salt structures ranges from approximately 500 to 2,000 ft. The Quitman field, Clarke County, Mississippi, and the Choctaw Ridge field, Choctaw County, Alabama, are examples of this type.

2. *Buried salt ridges.*—Downdip from the peripheral salt-ridge structures, the mother salt layer is relatively thin and salt supply to structures very limited. Salt flowage apparently took place soon after deposition of a moderate sedimentary overburden. Available salt was depleted during early structural growth so that there is very little structural growth indicated after Jurassic time. These structures appear as elongated ridges usually aligned parallel with regional strike. The salt thickness at the apex of these structures ranges from 500 to 2,500 ft. The Nancy field, Clarke County, Mississippi, is an example of this type.

3. *Intermediate salt structures.*—Basinward from the buried salt ridges, the mother layer is thicker, and the salt-formed structures have the appearance of an elongated deep-seated dome with a greater uplift. These structures are found directly downdip from the salt ridges and produced the traps at such fields as Cypress Creek. These structures show pronounced growth in older Mesozoic rocks and may produce an initial graben. In some places sufficient salt uplift took place after the graben was initiated to spread the graben faults apart (generally less than 0.75 mi), so that younger Jurassic beds were deposited over the salt within the graben, and pre-Haynesville (Late Jurassic) beds may be found only on the upthrown sides of these original faults. Apparently there was not sufficient salt available to permit significant growth of these structures during Late Mesozoic and younger times. As a result, only slight indications of structure are observed in beds above the Jurassic. The salt thickness at the apex of the intermediate structures ranges from 2,500 ft to 5,000 ft.

4. *High-relief salt structures.*—Farther basinward, the mother salt layer is sufficiently thick to furnish large amounts of salt. Consequently, the salt uplifts attain very large size and may have grown throughout Mesozoic time. The long duration of growth produced steeply dipping and very complex structures in the early Mesozoic beds; some of them were breached by a major salt extrusion. In these high-relief structures, the initial graben which was formed during early Mesozoic time commonly spread apart from 0.75 to 1.5 mi, but spreading ceased before late Mesozoic time. Younger grabens which affect late Mesozoic and Cenozoic beds are developed within the older graben. Potential Jurassic traps are present on the flanks of the large salt uplift, and generally are controlled by the original graben faults. The Pool Creek field is an example of this type of structure. A salt thickness ranging from 5,000 to 15,000 ft or more may be expected on this type of structure.

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PELAHATCHIE FIELD—MISSISSIPPI GIANT?

Pelahatchie field in Rankin County, central Mississippi, was discovered in 1962 with the completion of a well in the Early Cretaceous Mooringsport Formation. This discovery led to further step-out drilling for Early Cretaceous objectives and resulted in the establishment of production in the Paluxy, Rodessa, Sligo, and Hosston. The Early Cretaceous reservoirs are undersaturated and appear to have tilted water tables with no significant closure. A deep Smackover (Late Jurassic) test at Pelahatchie field in search of H_2S gas resulted in the discovery of high-pressure, high-volume oil production from a basal Smackover sandstone after finding CO_2 gas in the Buckner and upper Smackover.

The Pelahatchie structure appears to be quite large, with little or no fault complications. The highest development of structural closure is in the Late Jurassic Cotton Valley Formation and is very prominent in the older Smackover This field should prove to be one of Mississippi's largest.

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NORPHLET SANDSTONE, PELAHATCHIE FIELD, RANKIN COUNTY, MISSISSIPPI

The Late Jurassic Norphlet sandstone first produced oil in the Gulf Coast in the Shell-Love *et al.* Unit 1 W. D. Rhodes *et al.*, Pelahatchie field, Rankin County, Mississippi, from a depth of approximately 17,000 ft. Cores from the discovery and confirmation wells show that halite constitutes about 20 percent by weight of the rock. Flushing of the core increased the porosity from about 8 to 27 percent and permeability from about 4 to about 3,900 md; grain density was increased from 2.52 g/cm^3 to 2.63 g/cm^3. It is concluded that the halite was derived from the underlying Louann Salt and that the present porosity is a result of leaching by circulating groundwater.

[1] Published with the permission of Shell Oil Company.