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Preliminary Assessment of Louisiana's Uranium Potential

Eocene to Miocene strata of the Gulf coastal plain in Louisiana may locally host roll-type uranium deposits at shallow depths similar to those already being developed in Texas. Shows detected by gamma-ray logs taken while drilling for lignite in Wilcox and Claiborne Groups are equivocal, but could foreshadow uranium in younger units downdip. The overall uranium potential of Louisiana may be less than that of Texas because Louisiana is farther from the silicic volcanic centers of west Texas and Mexico which supplied the ash from which uranium was leached; however, published literature suggests that Louisiana may have comparable amounts of ash in the Tertiary section. Louisiana's more humid climate may have lessened uranium potential by increasing the amount of uranium lost to surface runoff.

The main potential is in Oligocene and Miocene units. The Jackson Group has less potential because of a general facies change from favorable strand-plain and deltaic host sandstones of Texas to shelf mudstone in Louisiana. The eastern part of the Miocene outcrop belt should have greatest potential because of the presence of underlying hydrocarbon trends which are apparently essential to keep the near-surface section strongly reduced and to concentrate uranium at shallow depths. The lack of significant surface gamma anomalies does not preclude the existence of uranium deposits in the shallow subsurface; most Texas deposits not exposed at the surface had no associated local gamma anomalies before mining began.

Uranium in solution can behave unpredictably in the complex Gulf Coast stratigraphic setting. Given tens of millions of years and multiple cycles of erosion and groundwater recharge, some ore-grade deposits of substantial size could have developed in any Tertiary sandstone that was once in hydrologic communication with the surface and an ash-laden source unit. Eocene strata updip of the Jackson outcrop, regardless of its low expected potential, could host uranium accumulations in local channel-sandstone remnants. Considering the complexities of channeling, additional reduction of previously formed oxidation cells, and disequilibrium, together with the sparsity of gamma-ray log control points available for the Louisiana units known to be prospective in Texas, the presence of uranium deposits in Louisiana must be considered as a possibility.

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Exploration Analysis of Jurassic Apalachicola Embayment of Florida

A petrophysical evaluation was made of the Apalachicola embayment Jurassic rocks from all available wells, using ores, cuttings, and electric logs. From this information, I propose that the embayment was formed by basement faulting, which resulted in a grabenlike structure. Two basins were formed on either side and within the embayment, together with a structurally high area at the entrance of the bay. These structures strongly influenced the patterns of water circulation and sediment deposition throughout the Jurassic. The Louann Salt was laid down throughout the embayment but was later eroded, with some of the Eagle Mills Formation, by the Norphlet fluvial sands. These Norphlet sands were deposited in a very arid climate by braided streams and then moved into eolian dunes. The initial marine transgression of the Smackover eroded the top of most of these sand deposits and laid down, in place, a fine-grained dense carbonate throughout the embayment in a tidal-flat environment. During the late Smackover marine regression, additional sediment was deposited, which was subsequently subaerially exposed to freshwater percolation, resulting in dolomitization. Lower Haynesville Buckner anhydrite was laid over the Smackover limestone, but much of the anhydrite was eroded by the continental sediments of the Haynesville. The Haynesville sediments show that there were marine fluctuations into the embayment throughout this time. The Cotton Valley sandstones were deposited throughout the area including the embayment. As hydrocarbon potential exists in the Norphlet and Smackover, a petrologic examination was concentrated on these formations. The fluvial Norphlet sands are conglomeratic, fine grained with interbedded red shales in the updip position, but were white to red, fine grained, and quartzitic in the center and at the mouth of the embayment. The Smackover limestones and dolomites are shallow, tidal-flat marine deposits and are composed of algal-coated grains, fecal pellets, Foraminifera, echinoid spines, and mollusk shells. Porosity and permeability reduction is due to large calcite crystal growth and closely packed dolomite rhombs in the pore spaces and pore throats. From a model application of a modern analog of a carbonate tidal flat, the most favorable reservoir rock would be expected in intertidal channels and sediment buildups at the embayment mouth.

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Depositional Environment of Jurassic Smackover Sandstones, Thomasville Field, Rankin County, Mississippi

Smackover sandstones in Thomasville field represent turbidite channel deposits. These sandstones are interbedded with a few thin beds of oolitic grainstones. A total of 969 ft (296 m) of core from three wells was examined, of which 820 ft (252 m) were sandstone. Depths ranged from 20,100 to 20,649 ft (6,131 to 6,298 m). Electric logs and cores from the three wells show abrupt facies changes, which may be expected from a shifting channel deposition. Correlations were made between the wells and environments of deposition determined from an examination of core composition, texture, and sedimentary structures.

Thick, massive bedsets and massive to laminated bedsets (A and AB units, respectively) are common in all cores, although massive (A) units dominate. Quartz grain sizes decrease upward in most bedsets. Sandstones have a mean grain size of 0.23 mm (fine grained). Carbonates exhibit similar textural trends and sedimentary structures.

Porosity and permeability average 5.1% and 0.32 md for sandstone, and 1.2% and 0.01 md for carbonates. A black, opaque residue, ubiquitous in the cores, represents residue of a former oil pool. Resistivity plotted against bulk density shows distinct groups for each rock type. A plot of resistivity versus porosity suggests a gas-water contact farther down the section at a depth of about 20,500 ft (6,253 m). Based on this study, the gas column is on the order of 300 ft (92 m) for about 50% water saturation.

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Facies Analysis of Cretaceous Hensel Formation—Response of a Fluvial System to Marine Transgression

The Lower Cretaceous Hensel Formation in central and north-central Texas consists of predominantly terrestrial