

Stratigraphic Traps in Base-Level Rise Deposits of Braided Alluvial and Arid Coastal Plain Sandstones (Frisco City Sand, Jurassic Haynesville Formation), Alabama

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Stratigraphic traps in the Upper Jurassic Frisco City sandstone surround isolated and buried Appalachian basement highs or inselbergs near the updip margin of the Gulf Coast Basin in southwest Alabama. Reservoir sands and gravels, representing arid coastal plain environments, onlap the basement highs at depths of 9,000–12,000 ft. Traps with four-way closure have formed where the sands and basement highs are overlain by top-sealing marine shales. The largest of these fields discovered to date (North Frisco City) is expected to produce over 24 MMBO from 16 wells.

Ephemeral stream channel and sheet flood processes deposited much of the Frisco City sand. Aprons of coarse sand and metamorphic clasts accumulated around the inselbergs as rockfall and debris-flow deposits. The basinward margin of the clastic wedge was reworked by eolian and marine shoreface processes.

Frisco City sands sharply overlie the Smackover Formation, Buckner anhydrite, or Paleozoic basement, marking a basinward shift of facies and sequence

boundary (141.5 Ma) at the contact. Basal Frisco City deposits consist of coarse alluvium, but these pass upward into coastal eolian and shoreface sands, and black marine shales of the middle Haynesville Formation. This succession indicates that deposition occurred during an overall base-level rise. However, some facies stacking patterns suggest that the overall rise was punctuated by several high-frequency base-level transit cycles or local tectonic relaxations during the final stages of extension in the Jurassic Gulf basin.

High-resolution 3-D seismic lines display stratal patterns indicative of retrogradational shoreface or alluvial lobe sand bodies onlapping basement highs. Differing oil/water contacts between these sand bodies may indicate compartmentalized reservoirs.

BIOGRAPHICAL SKETCHES

Lawrence R. Baria is a geological consultant and owner of Jura-Search, Inc., a company involved with exploration and research in the Upper Jurassic and Lower Cretaceous section of the Gulf Coast. Recent publications include topics on the sedimentology and seismic stratigraphy of the Cotton

Valley, Haynesville, Smackover, and Norphlet Formations, as well as facies and diagenetic studies in the Mooringsport and James Lime. Baria received his B.S. and M.S. degrees in geology from Northeast Louisiana University. His Ph.D. studies at Louisiana State University involved sulfate and carbonate diagenesis.

Robert Handford received a B.S. in geology from the University of Northeastern Louisiana, an M.S. from the University of Arkansas, and a Ph.D. from Louisiana State University. He has worked for the research laboratories of Unocal, Amoco, and ARCO, as well as the Bureau of Economic Geology at the University of Texas at Austin. After two years of consulting, he recently returned to the Bureau as a senior research scientist. His main areas of interest are sequence stratigraphy and depositional systems. During 1995–1996, he was an AAPG distinguished lecturer in carbonate stratigraphy.

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