DINNER MEETING, SEPTEMBER 19, 1983

JOHN W. CAGLE—Biographical Sketch

John Cagle is Manager of the Southeast Division for Conoco here in Houston. He received a BS degree in Geology from Cal Tech in 1952 and joined Conoco that same year. He has held a progression of positions with Conoco including Supervising Geologist, Division Geologist, Assistant to the Vice President and Division Manager.

For the past 27 years, Mr. Cagle has lived and worked on the Gulf Coast in Shreveport, Corpus Christi and Lafayette in addition to three separate stays in Houston. Thus, this is the third time he has been a member of HGS dating from 1956.

SMACKOVER-NORPHLET STRATIGRAPHY, SOUTH WIGGINS ARCH, MISSISSIPPI AND ALABAMA

John W. Cagle and M. Ali Khan

The structural framework for late Mesozoic sedimentation in the northern Gulf of Mexico basin includes a series of regional positive and negative warpings oriented perpendicular to depositional strike. The result is a series of uplifts and embayments. Hydrocarbon production occurs in both settings, but two of the uplifts (Sabine and Monroe) are directly responsible for giant hydrocarbon traps on their crests and flanks. The Wiggins Arch is interesting because, although significant production occurs on the flanks, the crest is barren. By analogy with the Sabine and Monroe uplifts, the crest of the Wiggins Arch should be a high-priority exploration area, yet it remains virtually untested.

The discovery of major Smackover and Norphlet production at Chunchula and Hatters Pond (Mobile County, Alabama) in 1974 and 1975, as well as Norphlet production at Lower Mobile Bay Field in 1979, did spur exploration in the area. Four wells have now penetrated the entire sedimentary sequence (20,000 feet) on the Wiggins Arch and reached basement rock (granite and phyllite). Three of these deep tests are recorded as penetrating an abbreviated stratigraphic sequence in which the Jurassic Haynesville Formation lies directly on basement rock. Thus, the Smackover, Norphlet, and Louann are missing. The absence of Louann salt from the crest of the Wiggins Arch comes as no surprise; but the absence of the primary target formations, Smackover and Norphlet, is certainly disappointing, because it implies that the crest of the Wiggins Arch is baldheaded.

Stratigraphic interpretation of seismic data indicates that three of the subject wells are located on small, isolated basement highs. Reflection characters around these highs and others indicate the presence of Norphlet sand and/or Louann salt. Thus, only the isolated highs are baldheaded, not the entire Wiggins Arch.

In the Wiggins Arch area, thickness comparisons of the Smackover-Haynesville are so anomalous that they strongly imply that the lower "Haynesville" was deposited contemporaneously with the Smackover. This implication is supported by palynological interpretation. Thus, the published sequence of Haynesville lying on basement in the three subject wells is only partially correct.

This sequence is actually a Smackover facies lying on basement, but the Smackover was deposited in a Haynesville-like sabkha which was perched on top of the basement highs. If this interpretation is correct, these sabkhas are likely to be flanked by high-energy reefs on the seaward side and oolite bars in tidal passes.

A modern analogy is deposition along the Trucial Coast of the southeastern Persian Gulf. Piercement salt domes form pre-Holocene outcrops and shoals far out into the gulf (50-100 kilometers). These shoals and islands are the sites of complex carbonate sedimentation which includes carbonate sands and muds, reefs, ooid shoals, and sabkhas.

The Smackover and Norphlet formations are major producing units in the area of southern Mississippi and Alabama. If the Smackover-Norphlet stratigraphy around the Wiggins Arch is similar to that proposed herein, a significant hydrocarbon trend exists. The stratigraphy proposed should offer both reservoir rock and hydrocarbon traps.