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fracture trend gradient (DPP > DFP).

In the expanded Miocene section of the study area, pore pressure increases at ~0.8 psi/ft, whereas fracture pressures increase uniformly at ~1.0 psi/ft. (point "C" in Figures 2 and 3). This separation results in increased seal potential and therefore greater possible maximum column heights with increasing depth. Three fields in the area are filled to spill, having hydrocarbon columns of 2100' (Neptune), 1900' (Marlin) and 1400' (King). An additional benefit, this pressure gradient differential increases the depth interval that can be drilled after each succeeding casing point resulting in reduced total drilling time.

A few wells drill completely through the expanded Miocene to the Lower Tertiary and Upper Cretaceous sections. This older stratigraphic section has significantly lower rates of sedimentation, as well as significant unconformities, and is associat-

ed with a notable transition to higher pressures. The pore pressure gradient increases abruptly (1.8 psi/ft) in the transition zone (point "D" in Figures 2 and 3). The separation between pore pressure and fracture trends is substantially reduced, resulting in diminished seal capacity and an accompanying reduction in maximum possible column height. An additional drilling consideration is that the transition may be quite abrupt with pressure differentials of 2000–3000 psi occurring in as little as 120' of vertical section.

In this local area the succession from the mildly pressured Miocene reservoirs, with high seal capacity, to the lower Tertiary and Cretaceous source rocks, with significantly decreased sealing capacity, provides a probable mechanism for expulsion and vertical migration of hydrocarbons. On deep high relief structures in the deep source section, any significant accumulation of hydrocarbons will result in buoyancy pressures that exceed the fracture pressure sealing capacity.

At that point, hydrocarbons can fracture the top seal and move vertically along salt/sediment interfaces or faults that extend up to the Miocene. Once above the pressure transition, hydrocarbons then charge lower pressured sands that have higher sealing capacity.

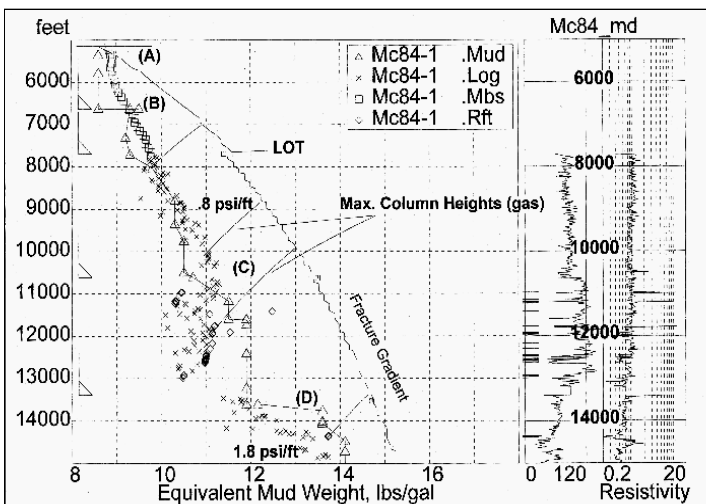


Figure 3: Mud weight (ppg) versus depth (ft.) for a typical well, MC 84 #1. Pressure (psi) versus depth (ft.) for a typical well, MC 84

## BIOGRAPHICAL SKETCH



**Bruce Wagner** earned B.S. and M.S. degree in geology from Florida State University. He has worked at Amoco since 1982 in exploration and exploitation assignments on the shelf and in deep water. Since 1991 he has been engaged in exploration and drilling in the GOM deep water, primarily in Mississippi Canyon and Viosca Knoll. In addition to prospecting, Wagner's geoscience interests include petroleum systems, geochemistry and pressure issues.

## References

Traugott, M.O., and Heppard, P. D., 1994, *Prediction of Pore Pressure Before and After Drilling—Taking the Risk out of Drilling Overpressured Prospects*, AAPG Hedberg Research Conference Abnormal Pressures in Hydrocarbon Environments, Golden CO, June 8–10.

Traugott, M.O., 1997, *Pore Pressure and Fracture Pressure Determinations in Deepwater*, World Oil pre-print, August.

Barker, J.W., and Wood, T.D., 1997, *Estimating Shallow Below Mudline Deepwater Gulf of Mexico Fracture Gradients*, presented at the 1997 Houston AADE Annual Technical Forum, April 2–3.

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