Significant statistical results support the idea that lithology of seal is of considerable importance. Sealing capacity is also correlated with seal thickness and depth.

These statistical results have been helpful in creating a quantitative assessment of hydrocarbon retention expectation for exploration prospect appraisals.

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Waulsortian Mounds and Lithoherms Compared

Lithified bioherms (lithoherms) in the northern Straits of Florida have been compared with the Waulsortian mounds of the Early Carboniferous of Europe. The lithoherms occur at 400 to 600 m in the presence of moderate bottom currents. A zoned coral-octacoral-crinoid community appears to build into the current as concomitant cementation provides a diagenetic framework. Coral debris, pelagics, bank-derived muds and cements compose the mound material. Exposed downcurrent surfaces are undergoing bioerosion.

The ancient mounds in the Belgium type area are composite structures with a lower (Tournaisian) sparry "blue vein" facies of fenestellid bryozoans cemented by marine calcite crusts and relatively little micrite. This is overlain by a Visean phase of micritic facies, still rich in fenestellids, with steep depositional slopes suggestive of subsea cementation. Outside Belgium, the mounds are predominantly micritic. They contain stromatactoid cavities which have also been associated with marine cementation. Work by others suggest that filamentous algae, including *Girvanella,* had some part in local generation of lime mud. Mound facies pass laterally into shaly limestones and shales with chert, which locally may be rich in algae.

Early Carboniferous continental reconstructions place the ancient mounds in a general equatorial carbonate margin or near margin. The paleo-oceanographic consequences suggest a light shallow mixed layer within which shallow equatorial upwelling could maintain moderate surface biologic productivity while not mixing deeply enough to fully oxygenate the slope and basin bottoms.

Ancient mounds, in contrast to the modern lithoherms, appear to have accumulated largely from submarine cementation of products of in-situ origin, in a setting of slower currents and possibly reduced oxygen levels on a bottom that may have been shallow enough to extend at times into the lower photic zone.

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Faunal Succession Within Deep-Water Coral Mounds North of Little Bahama Bank

Deep-water coral mounds of 5 to 40 m relief occur at depths of 1,000 to 1,300 m over a 2,500 sq km area of the lower slope north of Little Bahama Bank. These coral/gorgonian buildups, apparently unlithified, have yielded radiocarbon ages of 860 ± 50 and 940 ± 40 years for the best preserved corals and gorgonians, and preliminary dates of 22,100 years for the most intensively bored corals, the youngest deep-water coral mounds ever reported. Eight genera of deep-water coral represent the highest diversity recorded from a single locality. These ahermatypes are predominantly solitary, although branching and weakly branched forms are also present. The colonial ahermatypes from the mounds possess large-diameter corallites and relatively few corallites per specimen. Several of the coral general, most notably *Thecopsammia,* have significant stereomal deposits in the skeleton, a feature common among deep-water corals. The scleractinians are associated with a diverse fauna. The primary framework builders of the mounds, however, appear to be branching corals and gorgonians.

Based on the relative amounts of boring and Mn-oxide coating on coral specimens recovered from dredge hauls, there appears to be a crude faunal succession within the mounds. Branching colonial corals and gorgonians seem to be the pioneer forms, colonizing hardgrounds. These initial coral thickets form a baffle for sediment as well as substrates for later stages of attached and free-lying ahermatypes such as *Desmophyllum, Stephanocyathus,* and *Deltocyathus.* Thus the mounds grow through a combination of sediment trapping and colonization by a greater diversity of coral and other invertebrates. The coarse nature of intermound sediments and the presence of scour and ripple marks in underwater photographs indicate that bottom currents are vital to the development of these deep-water coral structures.

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Permian and Triassic Boundary of Southwestern Utah

The Permian and Triassic boundary, southwestern Utah, is marked by a topographic unconformity associated with a number of minor unconformities. The Harrisburg Member, Kaibab Formation, is the uppermost Permian unit. At its base a chert limestone is overlain by a gypsum in the west and a collapse breccia in the east. A fossiliferous limestone overlying the gypsum and collapse breccia is contorted over the collapse breccia, and is of a constant thickness suggesting that the evaporites were dissolved after its deposition. Above the medial limestone a siltstone is overlain by a limestone that partly fills topographic depressions in the medial limestone. Dissolution of the gypsum continued producing additional relief that was filled by another siltstone and limestone sequence. In the Beaver Dam Mountains gypsums are present above the medial limestone. Conglomeratic lenses (Rock Canyon Conglomerate) derived from the west and southwest are equivalent to both the Permian and Triassic sediments representing a major erosional cycle after the last retreat of the Permian seas and the advance of the Middle Triassic seas. The Timpoweap Member, Moenkopi Formation, was deposited on top of the underlying limestones and conglomerates developing a horizontal plane. It thins to a featheredge west of the Hurricane Cliffs and east of the Utah-Arizona state line suggesting that a positive area was present west of the Hurricane Cliffs during the Early Triassic. Thinning of the lower Red Member of the Moenkopi Formation also occurs west of the Hurricane Cliffs but in places it is absent, reflecting the topographic nature of the Permian and Triassic boundary. It was not until the deposition of the Virgin Limestone member of the Moenkopi Formation that Triassic seas covered the western part of Utah.

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Diagenetic Effects and Pore System Evolution

Permeability/porosity relations obtained from core measurements and well logs from numerous sandstone