ing the latest Tertiary overlie and are controlled by fans (deltas). Slump scars, gullies, zones of nondeposition due to currents, debris flows, and levees are identified. The Skralinge, Christian, Pining canyons, and other significant features are mapped in greater detail. Paleo-shelves and slopes of the continental margin are defined in seismic profiles. Differential erosion by the canyons reveals lithologic differences which further delineate the older structures. Implications for structural traps and resource deposits are encouraging if technology becomes available for the challenge.

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Nova Scotia Shelf Mesozoic Carbonates—Summary of Canadian Data Useful for Analogy to the South

Except for a few wells such as the Cost No. G-2 on Georges Bank, Mesozoic carbonates along the United States Atlantic seaboard are known only from seismic interpretation or from shallow or outcropping data collected by research vessels. Other sources of information are analogy from Florida-Gulf of Mexico wells, from European-West African Tethyan facies, or from wells on the Nova Scotia Shelf. Nova Scotia data that may be useful for comparison to offshore U.S.A. follows.

(1) Carbonate and deltaic sedimentation are synchronous during much of the Late Jurassic and earliest Cretaceous. (2) Smaller scale cycles and younger large scale vertical facies changes indicate repeated relative sea-level changes. (3) Shelf-edge profiles vary from rimmed/platform to prograding ramp near the Sable Island Delta where slope carbonate-shale deposits have been drilled. (4) Shelf-edge platform profiles also vary from reef-rimmed to channel to possible open sediment-bypass margins with ooid sands. Some faulted margins occur. (5) From Early to Late Jurassic, there is a reduction in evaporitic sediments, an increase in biotic diversity, and an increase in coals indicating an increasingly humid climate. (6) Depositional facies zones are easily distinguished and may be of shallow or deeper water aspect at a particular location. In the upper Abenaki, the skeletal-rich shelf margin has invariably been preserved. (7) True reefs occur. (8) Along the upper Abenaki shelf edge, carbonate facies also vary to include reef complexes, mud mounds, islands, oolite shoals, skeletal and oncolitic sands. (9) Termination of Abenaki carbonate sedimentation is either diachronous burial by deltaic sands or widespread synchronous Valanginian drowning possibly immediately preceded by brief subaerial exposure. (10) Abenaki diagenesis is dominated by porosity reduction due to burial, but dolomitization and early intraformational leaching occur at the shelf edge. (11) Later subaerial (or submarine) erosion at the top of the Abenaki occurs in a few widely separated areas. (12) Hydrocarbon shows are rare but do occur in the carbonates on some salt domes or in geopressured zones.

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Tectonic Influence on Sedimentation of Lower Cretaceous Strata, East-Central Powder River Basin, Wyoming

Recurrent movement of basement fault blocks in the east-central Powder River basin has controlled the distribution of porous and permeable reservoir facies within Lower Cretaceous strata. Subsurface isopach data for Lower Cretaceous time-stratigraphic intervals show repetitive thickness variations for both marine (Skull Creek and Mowry shales) and nonmarine (Inyan Kara and Newcastle/Muddy sandstones) units. Thickness patterns seem to be controlled by recurrent Early Cretaceous structural movement. Paleostructures ranging in width from 2 to 10 mi (3.3 to 16.6 km) and in length from 10 to 30 mi (16.6 to 50 km) trend northeast, northwest and north, and include segments of the Black Hills and Fanny Peak monoclines, which bound the west flank of the Black Hills uplift.

Early Cretaceous paleostructures seem to control the distribution of Newcastle valleys which are incised into the underlying Skull Creek Shale and drain southwest and northwest (corresponding to the Clareton, Hilight, Osage, Fiddler Creek, and Rozet fields). Alluvial plain valley-fill deposits in Newcastle Formation outcrop show abrupt facies and thickness changes which coincide with evidence of structural control (e.g., drape folds, faults, sandstone dikes, geomorphic lineaments, and increased igneous activity). A depositional model, incorporating tectonic and sea-level adjustments, illustrates that Newcastle channel incisement and valley fill are generally restricted to topographic and structural low (graben) areas. This model has been confirmed by detailed analysis of seismic data.

A model for tectonic influence on sedimentation aids in petroleum exploration by helping to predict facies distribution and fluid flow.

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Basin to Platform Transition, Middle Cretaceous, Mexico

Discontinuous outcrops west of Xilitla, San Luis Potosi, Mexico, preserve a sequence of middle Cretaceous (Albian-Cenomanian) carbonate rocks more than 1,500 m thick consisting of the following. (1) (Base) Well-bedded, cherty lime mudstones and wackestones with calcispheres and globular foraminifera. (2) Fine-grained, partly silicified peloidal and bioclastic lime wackestones and thin intraclast layers. (3) Massive graded beds of peloidal-bioclastic lime packstone with abundant echinoid fragments and spines, coral and mollusk fragments, but no rudists. (4) Lime breccias in massive beds with a variety of bioclasts including stromatoporoids and rudistids that are increasingly common upward. Breccias are interbedded with finely laminated, ripple-laminated, or micrograded beds alternating with burrowed mudstones. Dolomitized intervals are present at the base of unit 3 and within unit 4. (5) Massive beds of coarse rudist-fragment lime packstone. (6) (Top) Massive beds of rudist boundstone. Unit 1 is typical of basinal limestones of the upper Tamaulipas Formation. Units 2-4 represent basin-margin facies, the Tamabra Formation. Units 5 and 6 are characteristic of the reefal platform-margin Taminul facies of the El Abra Limestone.

This succession from pelagic basinal limestone to true reefs represents progradation of the eastern margin of the large (200 by 300 km) Valles-San Luis Potosi platform. Such progradational sequences are rare in the middle Cretaceous of east-central Mexico because the platform margins were steep (to 45°, locally near vertical) and relief was great (to 1,000 m). Although some faults may be present, the apparent thickness of the section (>1,500 m) is comparable to the total thickness of platform sections elsewhere.

Porosity is nil in the transitional sequence except for vugs and intercrystalline pores in the dolomite and small vugs in some of the debris beds. Clasts and particles within the basin-margin debris indicate diagenetic stages in the source area ranging from unconsolidated through lightly cemented (both submarine and subaerial) to leached and secondarily cemented.

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