changes in environmental conditions and/or oil characteristics.

Isobath maps show a displacement to the southwest (approximately 2.5 km) of the top of the anticline from deeper horizons to surface. In the upper and shallow zones, hydrocarbons are found in the south block only, divided into smaller blocks by an east-west fault pattern. Daily production is 160,000 bbl. Cumulative production is 125 million STB (October 1978).

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Grondin Oil Field, Gabon

After deposition of thick Aptian salt while the Atlantic Ocean was opening, the Gabon sedimentary basin was filled with mainly sandy continental and littoral deposits on the eastern margin and marine deposits on the west. The marine formations are mainly shaly, but a few sand layers, some thick, may be intercalated. Grondin oil field is related to one of these sands—the Batanga sandstone of Maestrichtian age. The sandstones are generally clean with good porosity, but some shales are interbedded. Gross thickness may reach more than 150 m.

The trap is an anticlinal salt structure, without noticeable piercing, though a median fault is obvious at the top. The producing sandstone is reduced by an internal unconformity. Nevertheless, the oil field, with a small gas cap, consists of a unique pool with a unique oil-water contact. Source rocks are post-salt marine shales, particularly in the Turonian. Migration probably occurred during the Miocene.

Grondin oil field, situated 40 km offshore, was discovered in 1971 by Elf Gabon and was rapidly developed. The initial recoverable reserves are estimated at 30 million tons (approximately 200 million bbl).

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Great Carbonate Bank of Yucatan and Its Petroleum Potential

Since 1972, numerous large and giant fields have been discovered in Chiapas and Tabasco States, southern Mexico, and in the offshore platform west of Campeche. Most of these fields produce from fore-bank talus, now largely dolomitized, of Late Jurassic and Early to middle Cretaceous ages. Drilling depths to the tops of the reservoirs generally are 3,800 to 4,500 m. Offshore discoveries include fields which also are productive in fore-bank talus of Paleocene age. The petroleum source materials for the Jurassic-Cretaceous fields are believed to be mainly Jurassic. Proved reserves in these new fields are 20 billion bbl.

Although some porosity and permeability are primary, most is secondary—the result of solution, dolomitization, and intense microfracturing. The original trap for the Late Jurassic–middle Cretaceous fields was stratigraphic, but the present traps are fractured, faulted, domal salt pillows created during the Laramide orogeny.

The basis for the discovery of the fields was the widespread presence on the Yucatan Peninsula, and in the states of Campeche, Chiapas, and Tabasco, of Cretaceous through Tertiary back-reef or lagoonal facies—carbonates, anhydrites, and some halite. In addition, more than 200 oil seeps were known in a linear zone along the foot of the Sierra Madre, adjacent to the coastal plain. By analogy with the Golden Lane, it was concluded that a great fore-bank talus deposit should lie gulfward from the lagoonal facies. With this geologic concept in mind, seismic work was commenced, and drilling during 1971-72 led to the dual discoveries of the Cactus and Sitio Grande fields in 1972.

The great carbonate bank of Yucatan is believed to continue northwestward into Veracruz State, where several discoveries have been made in carbonate rocks of Early to middle Cretaceous age in thrust sheets buried beneath the coastal plain. We believe that large, subthrust, anticlinal structures underlie the thrust sheets of the Veracruz basin and that, when drilled, these also may be the sites of giant-field discoveries.

Although the potential for this large area is great, it is too early to speculate on the potential reserves of the numerous but still untested structures of the region.

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Controls on Late Cretaceous–Paleocene Sedimentation in Wyoming

Recent developments in the time-stratigraphic interpretation of seismic record sections have indicated the need for separating tectonic and eustatic processes. The combination of a eustatic rise with a major orogenic episode during the Paleocene in Wyoming resulted in a stratigraphic sequence of economic importance. This sequence was deposited during a period of worldwide onlap, and a period of thrusting and foreland uplift. More than 5,000 ft (1,500 m) of stratigraphic fill of intermontane basins record these processes. Lithologic, environmental, and petrographic observations indicate sea-level changes, strandline positions, paleocurrent patterns, and areas of provenance.

Authigenic glauconite suggests an area of brackish to marine transgression within the "Cannonball sea." Supporting this observation, specific vertebrate faunas indicate that central Wyoming was inundated by the worldwide post-Danian transgressive onlap. Other environmental criteria support the paleogeographic reconstruction of a broad interior sea invading an area of rising uplifts, encroaching thrust plates, and subsiding basins. These boundary conditions provided the framework for the development of commercial hydrocarbon and coal accumulations.

Lacustrine and marine source and reservoir rocks, coastal swamps, and thick subbituminous coals were developed in response to the climatic, tectonic, and eustatic history. These aspects are interpreted from the mineralogy, palynology, petrophysical responses, and the facies patterns in outcrop and subsurface sections.

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