ment. In many projects, the final product is a combination of manual drafting, computer drafting, and "standard" computer application techniques.

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Contourite Anticlines as Exploration Objectives

Regional seismic profiles off the east coast of the United States gathered by the University of Texas Marine Science Institute and Woods Hole Oceanographic Institute have crossed three types of contourite anticlines. They are symmetric, asymmetric, and half-anticlinal forms and have up to 3,000 ft (1,000 m) of relief. Off the east coast, contourite anticlines have been found in sections of Paleocene to recent age. They are the result of erosion, transport, and deposition by bottom currents that flow along the break between the continental slope and the continental rise. Because of the relation to deep-water currents flowing along this break in slope, the resulting deposits have been named "contourite anticlines." Explorationists should be alert to the presence of contourite anticlines and realize the limited exploration potential of this type of anticline. Recognition of their true nature early in exploration programs may save millions of dollars.

Seismic reflections from Wilcox (lower Eocene) deep-water sediments of south Texas show that large—more than 10 × 5 mi (16× 8 km), 2,000± ft (600± m) closure—anticlinal features were developed by deposition basinward from submarine fans. Texaco 1 Rodriguez was drilled in 1968 to 17,752 ft (5,326 m) on one of these contourite anticlines. The section within closure (below a drill depth of 8,700 ft; 2,610 m) penetrated by this test was entirely shale.

Available data on present-day contourite anticlines indicate that the currents that form them are capable of moving only clay-size material. Until stronger currents are documented, sandstones or any other type of reservoir, with the possible exception of fractured chalk, would not be expected in these features. Drape crestal grabens are present over some of the Wilcox contourite anticlines of south Texas. Production has been obtained from the median-depth (9,000 ± 1,000 ft; 2,700 ± 300 m) upthrown fault traps associated with these grabens.

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Depositional Environments and Their Relation to Porosity in Upper Smackover Formation (Jurassic), Paup Spur Field, Miller County, Arkansas

Cores from 13 upper Smackover wells in the Paup Spur field, Miller County, Arkansas, and adjacent areas have been studied to define depositional facies from sedimentary structures and carbonate textures. A depositional model is developed from these data. Petrographic studies of thin sections show the relation of diagenetic events to facies, and help unfold the history of porosity development.

The vertical succession of facies in the upper Smackover Formation may be interpreted as an upward-shoaling sequence. From the base, burrowed and oncolite-bearing pelmicrite is overlain by burrowed and bimodally cross-bedded oosparite and pelsparite. These in turn are overlain by algal biolithite and pelsparite. Shale and anhydrite of the Buckner Formation overlie the upper Smackover. Contacts between all facies are gradational.

A depositional model based on this vertical sequence consists of low-energy peloidal carbonate mud deposited seaward of a moderate to high-energy oolite and pelletal-shoal complex. Bimodal cross-bedding indicates tidal influence on the shoal. Landward of the shoal complex, algal mats and peloidal mud were deposited in a low-energy intertidal environment. Farther landward, sabkha evaporites of the Buckner Formation were deposited.

Porosity is highest in the cross-bedded oosparite and pelsparite facies (greater than 25%), where molds of oolites and pellets are the principal pore types. In the algal biolithite facies, porosity reaches 15% and is principally moldic, interparticle, and fenestral pore space. Some interparticle porosity in the algal facies may result from dissolution of anhydrite cement.

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Downcurrent Change in Miocene Canyon-Channel Systems in Indus Submarine Fan

Multichannel seismic profiles with excellent resolution reveal the internal morphology of Miocene canyon-channel-levee systems in a part of the Indus submarine fan. Individual canyon-channel-levee systems may be correlated from profile to profile in a down-canyon direction for at least 160 km. Each canyon or channel complex consists of numerous smaller canyons or channels which have migrated, avulsed, and aggraded during a long complex history to produce the morphology observed in the seismic profiles.

Detailed examination of seismic lines over two canyon-channel-levee systems has resulted in the recognition of degradational, transitional, and aggradational zones, respectively, in a distal direction. The distribution of these zones and their associated processes is controlled by canyon-channel gradient. The degradational zone is characterized by an erosional base and is dominated by bank migrational deposits. The processes responsible for these deposits are poorly known. The transitional zone also has an erosional base but is marked by the presence of small levees. Deposition in this zone results from bank migration followed by channel-current and overbank processes. The aggradational zone is characterized by a depositional base and large levees resulting from channel-current and overbank processes which may include both sediment and fluid density flows. In each of the two canyon-channel-levee systems studied, aggradation has resulted in the gradual proximal displacement of the degradational, transitional, and aggradational zones.

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