phology and distribution of reservoir sandstones. Stratigraphic dip data were correlated with primary rock properties observed in cores and with borehole-log data to define the internal morphology of turbidite channel sandstones in the Cherry Canyon Formation at Indian Draw field. Characteristic dip patterns allowed the delineation of erosional unconformities, channel sequences, slump faulting, contorted and massive bedding, and sedimentary drape.

The erosional unconformity which marks the base of the Indian Draw channel exhibits a characteristic dip pattern consisting of an abrupt change in the trend of dip magnitude and dip azimuth across the unconformity, marked by higher dips (6 to 9°) above the unconformity in the channel-fill, and lower dips (2 to 4°) in the basin-plain sediments below. Slump faults exhibit an abrupt increase in dip with depth over a small interval, and an associated progressive dip azimuth rotation approaching the fault. Contorted beds show a random dip pattern, often marked by poor-quality, high-magnitude dips. Massively bedded sandstones lack computed dips and sedimentary drape patterns typically consist of a decrease upward within basinal deposits overlying a sandstone.

Detailed mapping of the reservoir sandstones indicates deposition as stacked, laterally discontinuous lenses within a previously eroded channel. Direction of sedimentary drape over sandstone lenses can be used to map their trends. Channel-fill lenses are 5 to 30 ft (1.5 to 9.1 m) thick, and are elongate parallel with depositional dip with a sinuous geometry. Such turbidite channel deposits can be anticipated to form complex multilayered reservoirs, consisting of a series of isolated sandstone lenses of restricted areal extent.

REED, B. K., Independent, Oklahoma City, OK

Viola Potential, Southern Oklahoma

No abstract available.

REID, ALASTAIR M., II, Moseley Petroleum Corp., Midland, TX, and SYDNEY K. LAWLER and JAMES D. PAULSON, Texaco USA, Midland, TX

A Joint Geological-Engineering Study of Cogdell Canyon Reef Unit, Scurry and Kent Counties, Texas

In 1974 Texaco Inc. initiated a detailed geological-engineering study of the reservoir in the Cogdell Canyon reef unit. The goal of this study was to improve production. The Cogdell Canyon reef unit is located in the Horseshoe Atoll of northern Scurry and southern Kent Counties, Texas.

Detailed lithologic, paleontologic, and depositional environmental analyses indicate the presence of nine vertical zones ranging from late Strawn to early Cisco time. Six zones are recognized by paleontologic criteria alone, with three additional zones defined by lithologic criteria.

Each zone exhibits multiple depositional environments. Each environment produced a different rock fabric. Porosity and permeability, partly controlled by the original rock content and fabric, change laterally within each vertical producing zone.

The geologic model consisting of vertical stratification and lateral change within the Cogdell Canyon unit is compatible with engineering data resulting from known production since 1949. This geologic model also is compatible with increased oil production resulting from infill well drilling and redirection of the waterflood.

ROBICHAUD, STEPHEN R., Border Exploration Co., Midland, TX

Predictive Model for Hydrocarbon Entrapment in Marathon Fold-Thrust Belt of Southwest Texas

The requisites for hydrocarbon entrapment (source rock, reservoir rock, and sealed trap) are present in the Marathon fold-thrust belt. The Pennsylvanian and Wolfcampian shales in the Marathon area probably yielded hydrocarbons during diagenesis and porosity has been observed in several potential reservoir strata. Thrust and reverse faults are among the trapping mechanisms that have been observed and evidence of stratigraphic porosity and lithology pinch-outs and tectonic wedge-outs has been reported. A predictive model of the subsurface occurrences of such traps is based on the premise that compression from the Permo-Pennsylvanian collision of North America with South America created a back-arc fold-thrust belt at Marathon. This model identifies some of the components of the collision orogene and it describes some of the geologic processes that created those components.

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Sedimentary Facies and Depositional Environments of Cenomanian Buda Limestone, Northern Coahuila, Mexico

Buda Limestone in northern Coahuila ranges in thickness from 15 to 35 m and consists mostly of lime wackestone and mudstone. Two major facies developed in the area in response to contrasting environmental conditions: a northern mudstone-wackestone facies composed mostly of benthic fossils deposited in water depths less than 100 m and a southern wackestone facies with abundant pelagic fossils deposited in water as deep as 500 m. A fossiliferous, intraclast packstone facies developed on shoal areas in adjacent trans-Pecos Texas. These shoals may have been related to areas of tectonic adjustment.

Subfacies developed in the north differ in intensity of bioturbation, fossil content, and amount of terrigenous clastic content. The lower and middle Buda contain a diverse benthic fauna, abundant burrows, and up to several percent quartz silt and clay in places. The upper Buda contains a benthic fauna low in diversity and number of specimens, rare burrows, and a lesser amount of terrigenous clastics.

Distribution of the two principal facies of the Buda in northern Coahuila conforms to late Albian paleogeographic features—the broad flat carbonate platform north of the Stuart City reef, and the deeper basinal area on the south. In the north, a broad low-relief shelf over the preexisting platform was characterized by open marine conditions although there is some evidence of restricted water circulation in the northeast part. The water was deep enough so that the sea floor was rarely disturbed by wave action. Normally clear waters were periodically muddied by an influx of terrigenous clay and silt. South of the preexisting Stuart City platform margin, waters were clear and deep.

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Lower Atoka Group (Lower Middle Pennsylvanian), Northern Fort Worth Basin, Texas—Depositional Systems, Facies, and Hydrocarbon Distribution

Lower Atoka is an informal name applied to the lowermost

depositional sequence of the Atoka Group, which is partly equivalent to the Big Saline Formation. Depositionally it reflects a transition from carbonate to terrigenous-dominated environments. Chert litharenites derived from the Ouachita structural belt and locally from the Muenster arch first prograded across the northern part of the Fort Worth basin during lower Atoka deposition.

Lower Atoka strata are interpreted to be a fluvially dominated fan-delta system which exhibits characteristics of both a fan delta and a high-constructive elongate delta. Fan-delta characteristics include tectonically active source, poorly developed alluvial plain, and interfingering and/or coexisting terrigenous and carbonate facies. High-constructive elongate delta characteristics include elongate, digitate sand-body geometry and a facies tract reflecting rapid progradation and aggradation.

Contemporaneous faulting within the basin was a major factor in distribution of lower Atoka facies. Sediment was confined to the downthrown sides of contemporaneous faults resulting in superposed fan-delta deposits. Stacking and coalescing of early fans constructed an alluvial plain. When sediment supplies exceeded fault movement, the fan deltas continued to prograde across the basin.

Cumulative oil and gas (equivalent) production from the lower Atoka is over 130 million bbl. Production is facies controlled and the distribution of fields coincides with the distribution of fan-delta lobes. Fields are aligned predominantly on the basinward side of major faults and they produce from fan-delta channel-fill and coarse-grained fan-delta plain facies.

THOMPSON, SAM, III, New Mexico Bur. Mines and Mineral Resources, Socorro, NM

Petroleum Exploration in Pedregosa Basin, Southwestern New Mexico

In southern Hidalgo and Grant Counties, New Mexico, the northwestern end of the Pedregosa basin has a high petroleum potential. Paleozoic rocks, dominantly shallow-marine carbonates, are over 11,000 ft (3,350 m) thick. Of the 11 formations, ranging in age from Cambrian to Permian, 7 contain favorable oil- or gas-source units. Mesozoic rocks, generally shallow-marine limestones and deltaic sandstones-mudstones, are nearly 10,000 ft (3,050 m) thick. Two of the three Lower Cretaceous formations contain favorable source units. Gas-prone kerogens are more abundant than the oil-prone types. At normal depths of burial, organic matter in the source units has reached thermal maturity, and some in the older formations is overmature. In the lower plate of a major Laramide thrust fault, the Lower Cretaceous units are overmature and the older Paleozoic units may be thermally metamorphosed.

Best reservoir objectives are the porous dolostones, totaling 484 ft (148 m) in thickness, in the upper part of the Horquilla Formation (Pennsylvanian-Permian). They are located at the shelf margin of a deep-marine basin. Other favorable reservoir units are indicated in surface exposures.

In this frontier area, only 11 exploration wells have been drilled to Precambrian, Paleozoic, or Mesozoic rocks. Shows of oil or gas were reported in 6 of the wells. None of the wells have tested the better reservoir objectives in the deeper parts of the graben valleys, where commercial accumulations of petroleum are likely to be preserved. Tertiary-intrusive and volcanic-cauldron complexes have thermally metamorphosed older sedimentary units only locally. Basin and Range faulting has disrupted subsurface fluid systems in many parts of the area. Despite the challenging risks, the high potential encourages further exploratory drilling on selected petroleum prospects.

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Depositional Facies, Diagenesis, and Reservoir Heterogeneity of Upper San Andres Formation in West Seminole Field, Gaines County, Texas

The upper San Andres Formation at West Seminole field can be divided into three depositional sequences of transgressive, regressive, and transgressive cycles culminating in thick tidal-flat deposits. Diagenesis altered sabkha environments via dolomitization, anhydration, and de-anhydration. Heterogeneous porosity and permeability result in porous and permeable layers separated by nonporous and impermeable layers or porous and impermeable layers. The reservoir characteristics are the combined results of depositional facies and diagenesis.

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