Maverick basin of the Rio Grande embayment is a series of overlapping sand bars striking northeast-southwest. Grain-size plots and core descriptions indicate that these bars developed in a shallow-marine shelf environment. There are as many as five cycles of sand sedimentation, all but one having established production. These sandstones have a cumulative production of over 50,000 bbl of oil since 1948. Over 30,000,000 bbl of oil has been produced from stratigraphic-type fields discovered since 1970. Stratigraphic-type fields have produced over 90% of the total production. Structural traps, caused by differential compaction over volcanic necks, account for the remainder. Torch field, associated with a volcanic neck in Zavala County, and Sacatosa field, a stratigraphic trap in Maverick County, are typical. The depth and density of control, as well as the subtle expression of the traps, leave many prospective areas.

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Independent Geologists—Endangered Species

During the last 5 years, while constantly complaining about a supposed lack of competition in the extractive industries, the U.S. Congress and administrative regulatory agencies have focused their power to make this "lack of competition" real. Current examples are: (1) in the SEC, the constant effort to broaden the definition of a security and bring the attendant registration and disclosure requirements to bear on the most mundane joint venture; (2) in the Congress and the SEC, the pressure to bring about accounting changes limiting independents' access to equity markets and encouraging sellouts and mergers; (3) in the IRS, grotesque definitions of joint ventures as partnerships, partnerships as corporations, and farmouts as income; (4) in the FERC, strained interpretations of gas contracts as "convenants running with the land" in order to introduce the principle of administrative confiscation of mineral rights without due process. The ponderous weight of the regulatory hand weighs most heavily on the independent geologist who has no legal or accounting staff.

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Stratigraphy and Exploration Geology of Marble Falls Group, Llano Uplift to Southern Part of Fort Worth Basin

The Marble Falls Group is a Lower Pennsylvanian carbonate complex that crops out in a discontinuous arcuate belt rimming the east, north, and west sides of the Llano uplift. The carbonate beds accumulated on the eastern part of the Texas craton, which sloped toward the adjacent Fort Worth basin. Three units within the Marble Falls Group have been mapped in the outcrop area. They are informally referred to as the "lower limestone," "middle shale," and "upper limestone." The same tripartite subdivision is evident in the subsurface north of the Llano uplift in Lampasas, Mills, Hamilton, Comanche, and Brown Counties.

Marble Falls gas production in the southern part of the Fort Worth basin is almost exclusively from the upper limestone. The upper Marble Falls forms several northeast to southwest-trending carbonate-bank complexes. The bank complexes terminate abruptly and pass laterally into shale and dark spiculitic limestone. Both structural and stratigraphic traps are evident within the bank complexes. Pottsville field in Hamilton County is a steep-sided structural trap from which 10 wells have produced approximately 33 Bcf of gas at depths of 2,600 to 2,900 ft (792 to 884 m). Santa Anna field in Coleman and Brown Counties is a large stratigraphic trap discovered in 1928. More than 100 gas wells have been completed in Santa Anna field. Early production records are not available. However, the incomplete data that are published substantiate the fact that Santa Anna is a large, economically attractive field, in which many wells have produced at least 1 to 2 Bcf of gas at depths of 2,300 to 2,400 ft (700 to 732 m).

Porosity tends to develop within three facies of the upper Marble Falls limestone: phylloid algal limestone, stromatoporoid limestone, and oolitic carcarenite. At the outcrop, the algal, stromatoporoid, and oolitic facies are most prevalent near the edge of bank complexes. However, they are by no means restricted to the outer part of the banks. Fractures related to a system of mostly down-to-basin normal faults enhance permeability in many places.

Structure is complicated and difficult to perceive without seismic data. Even where seismic data are available, standard isopach mapping techniques cannot be employed because there are no continuous shallow seismic reflectors. Moreover, topographic highs capped by Edwards Limestone outcrops tend to yield poor-quality records.

In spite of the problems inherent in exploring a structurally and stratigraphically complex area, there are undoubtedly undiscovered, commercially attractive gas fields in the southern part of the Fort Worth basin. The high exploration risk is to some extent offset by shallow depth, low acreage costs, and the attractive nature of potential targets.

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San Andres Facies Patterns, Palo Duro and Dalhart Basins, Texas

Regional facies analysis of San Andres/Blaine (Guadalupian, Permian) strata of the Palo Duro and Dalhart basins by use of cores, cuttings, and well logs is of interest for hydrocarbon exploration. San Andres rocks are composed of dolomite, anhydrite, and salt and exhibit basinward (southerly) facies changes from supratidal to subtidal. Supratidal facies reflect many features of modern, low-relief coastal sabkhas.

Lower San Andres strata include five mappable cyclic units; each cycle is comprised of (1) subtidal to intertidal shelf carbonates (basal transgressive facies), (2) lower sabkha, nodular and bedded anhydrite, and (3) upper sabkha salt formed in brine ponds and evaporating pans. Cycles represent repetitive progradation of facies to the south through time. Salt beds pinch out in the central and southern parts of the Palo Duro basin and mark the basinward limit of the upper sabkha evaporating terrane. Upper San Andres intertonguing anhydrite