unusual in these multi-reservoir fields.

The Hansford gas area of Hansford County is a large multi-reservoir field. Accumulation is controlled by lensing sandstones on the northwest flank of the Anadarko basin. Gas production occurs in rocks of various ages but the dominant number of reservoirs are Morrow in age. The Lips field in northern Roberts County has gas production from Morrow sands and is situated on a pronounced anticline. The accumulation of gas in this reservoir may be due in large part to its high structural position; however, there are other Morrow sand reservoirs in the adjacent area that are not astride this anticline.

Several large interstate gas pipelines traverse the Panhandle area and furnish a ready market for gas. Present prices paid for gas average 15–17 cents per MCF. This ready market, and numerous gas discoveries of the past year, have kept the drilling activity in the western Anadarko basin at a brisk pace through the first half of 1960. Large untested areas within this basin area, combined with favorable discovery rates and access to pipelines, give indications that the accelerated pace of exploratory drilling and development drilling will continue through the remainder of this year and into 1961.

ROBERT J. HESTER, Cosden Petroleum Corporation, Midland, Texas
RICHARD R. HOLLAND, Phillips Petroleum Company, Midland, Texas

Geology of Puckett Field

Geographically, the Puckett field is 27 miles southeast of Fort Stockton in central Pecos County, Texas. Structurally, it is a large faulted anticline on the north flank of Val Verde basin.

The geological evolution of this feature was controlled, primarily, by three periods of uplift and erosion —one in early Pennsylvanian time, a second in either late Pennsylvanian time or early Permian, and a third movement, sometime after the close of the Permian.

The discovery of gas here in 1952 opened one of the world's largest gas reserves and has contributed immensely to the unraveling of the geologic history of the Val Verde basin.

LOYD E. WALKER, Plymouth Oil Company, Midland, Texas

Geology of Benedum Field, Upton County, Texas

The Benedum field, in the east-central part of Upton County, Texas, is in the southwestern part of the Midland basin. It is an elongate anticlinal structure having a major fault along the east flank. Minor radial or peripheral faults are probably present; however, the throw of these faults appears to be less than the productive thickness of the Ellenburger section.

Surface elevations range from 2,618 to 2,710 feet in the Benedum field. A contour map of these elevations indicates a southeastward nosing in the central part of the field.

Gas condensate is produced from three reservoirs in the Benedum field. The Pennsylvanian produces from an average depth of 10,600 feet, the Fusselman from an average depth of 11,000 feet, and the Ellenburger from an average depth of 11,300 feet. These reservoirs range in size from 1,600 acres for the Pennsylvanian to 9,700 acres for the Ellenburger.

The presence of structure was detected by a seismograph survey, first in 1935 and later confirmed in 1946. The discovery well for the Benedum field was the Slick Urschel Alford No. 1 in the SE. $\frac{1}{4}$ of Lot 2, Sec. 50½, P. B. Scott Survey. This well was completed in the Ellenburger at total depth of 12,022 feet on December 6, 1947. The Fusselman reservoir first produced in October, 1948, from the Republic Natural Gas Company Barnet "A" No. 1 well located in the NW. $\frac{1}{4}$ of Sec. 40, Block Y, TCRR Survey. Pennsylvanian production was first established by the completion in April, 1948, of the Fred Turner Jr. (now Humble) Barnet No. 1 located in NW. $\frac{1}{4}$ of Sec. 4, Block Y, GC&SF Survey.

MARSH W. NOTTINGHAM, Continental Oil Company, Roswell, New Mexico

Recent Bell Canyon Exploration in North Delaware Basin

The upper Bell Canyon reservoir sands of the North Delaware basin are very fine-grained, arkosic sands cemented with small amounts of carbonate. Their blanket distribution and sedimentary textures suggest a depositional medium such as density currents.

The geologic history at one stage seems to have involved a pre-depositional sorting of the sand prior to its final transportation across the North Delaware basin. The reservoir sands exhibit a uniformity in texture, and mineralogy that might allow them to be termed "blanket," even though they do not exist with uniform thickness throughout the basin. This thickness ranges from a trace to approximately 70 feet, having a cross-sectional shape characterized by a concave base and a flat top.

The location of these sand bodies seems to be determined by local subsidence or compaction of the pre-Ford sediments. The fact that some of these sand bodies are not continuous over the local adjacent highs gives rise to the trap mechanism of the reservoir. A favorable hydrodynamic condition may also be increasing the efficiency of the trap. Evaluation of the reservoir section is greatly enhanced by core analyses and the Gamma-Ray Sonic type log.

The two most prominent fields in the North Delaware basin are the North Mason and El Mar fields, the former producing since 1952 and the latter since early in 1959. Their average reservoir characteristics are very similar: porosity 24%, permeability 25–34 md., oil saturation 13%, and water saturation 44%.

Wells can be drilled for as little as $20,000 depending on the depth required in the location in the basin. Accumulative production to date is approximately 7,500,000 barrels for the entire Mason and North Mason fields over 8 years, and 950,000 barrels for the entire El Mar field over a 1-year period.

Deeper possibilities exist throughout the 4,000 feet of the Delaware Mountain group, as well as in the pre-Permian sediments. Future discoveries are imminent, for well density is increasing each month. This allows better evaluation of each new test, thereby giving rise to more realistic acreage appraisals.

WILLIAM J. LE MAY, Hondo Oil and Gas Company, Roswell, New Mexico

Oil Accumulations along Abo Reefing, Southeastern New Mexico

During Abo (lower Leonard) time, clastic deposition in the Delaware basin was separated from the lagoonal deposits on the Northwest shelf by a transgressive barrier reef. A lithologic study of the Abo formation reveals facies changes from shelf to reef to basin. Shelf or back-reef deposits consist of interbedded green shale and light gray to tan, fine crystalline, anhydritic dolomite. The interfingering of shelf and reef dolomites form an effective permeability barrier to the migration of fluids