The upper Miocene Castaic Formation was deposited in the Ridge basin along the east side of the San Gabriel fault. Paleoecologic analysis of the Castaic Formation furnished information about the paleotopography along the fault, and provides information about activity on the fault during the late Miocene. The northern part of the Castaic Formation was deposited in an embayment bounded on the west by land extending southward immediately west of the fault to the vicinity of Castaic. Southeastward from Castaic, this positive feature extended as a submarine sill, behind which the maximum water depth in the Castaic basin was not less than 50 fathoms. The microfauna in the mudstones deposited in this silled basin consists of diatoms, radiolaria, normal planktonic forams, and dwarfed and deformed benthic forams. The southern part of the Castaic Formation was deposited on a broad shelf open westward to the Pacific Ocean. Sediments along the southeastern margin of the basin suggest little relief and slight tectonic activity in the areas of the southern Soledad basin and the western San Gabriel Mountains, in contrast to the high relief west of the San Gabriel fault along the northwestern boundary of the Castaic basin. The Castaic Formation was deposited in a normal-marine environment. Lateral faunal variations, interpreted in the past to indicate brackish conditions, are attributed instead to variations in substrate and topography along the basin margin.

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Depositional Environment of Neogene Mehrten Formation at Its Type Section

The Mehrten Formation represents a major period of Neogene nonmarine sedimentation in east-central California. The Mehrten Formation was originally defined as andesite-rich clastic sediments deposited in the Mokelumne River drainage basin of the Sierra Nevada foothills. The unit has since been extended to include volcanogenic sandstones, mudflows, and lava flows occurring throughout the foothills and in the Sierra Nevada itself. However, the precise depositional history and chronology of the Mehrten Formation have remained largely undocumented.

Preliminary studies undertaken in the area of the type section at Camanche Lake suggest that the andesitic sediments of that region were deposited in a braided fluvial system. Upward-fining sequences of coarse-grained andesitic sands and gravels cut by channeled conglomerates reflect this depositional environment. The occurrence of clast-supported gravels and sandy matrix-supported gravels, which grade laterally and vertically to planar and trough cross-bedded sands, further suggests that the braided fluvial system was located on the distal reaches of an alluvial fan. This particular alluvial fan was shedding coarse clastic debris to the west. Alluvial-fan deposits in the Mehrten Formation are tectonically significant because they record the onset of late Tertiary vertical tectonics in the Sierra Nevada. The andesitic composition of the sediments further reflects the convergent nature of active tectonism in California at this time.

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Deep Thermal Structure of Mimbres Basin, New Mexico—Implications for Oil and Gas Potential

The Mimbres basin of south-central New Mexico is the westernmost of the deep sedimentary basins which comprise the Rio Grande rift, a tectonic province of high heat flow trending northward from northern Mexico to central Colorado. The Mimbres basin is bounded on both sides by normal faults that have been active during the Quaternary. Quaternary basalt flows are also present in the area. Heat flow values in the basin are typically 60 to 110 mWm^{-2} and shallow geothermal gradients are typically 30 to 50°C/km.

Detailed temperature logs from 17 shallow boreholes less than 120 ft (40 m) deep have been obtained from wells located within and adjacent to the Mimbres basin near the international border with Mexico. The geothermal gradients from these wells have been continued downward through a typical "basin and range" conductivity model in order to estimate the deep, steady-state thermal structure within and beneath the basin. The predicted temperatures have been checked against temperatures measured in two separate oil tests at depths of 6,624 ft (2,019 m) and 9,435 ft (2,876 m) and found to agree to better than 5°C (9°F). Temperatures within the upthrown blocks adjacent to the basin are higher than those within the basin, a phenomenon that results from thermal refraction. Within the basin, the 120°C and 150°C isotherms are encountered at depths of 13,000 ft (4,000 m) and 18,000 ft (5,500 m). In the adjacent ranges, these isotherms are encountered at depths of 11,000 ft (3,400 m) and 16,500 ft (5,000 m), respectively. These depths are substantially deeper than might be inferred on the basis of the basin's tectonic setting or on the basis of the high gradients measured in the shallow boreholes. The temperatures in the deeper parts of the basin as well as part of the underlying basement are well within the liquid window of hydrocarbon stability. The downward continuation of shallow temperature gradient data appears to be an adequate tool for resolving the deep thermal structure of the Mimbres basin.

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Precise Gravity Survey Across Newport-Inglewood Structural Zone, Long Beach, California

A major strand of the Newport-Inglewood structural zone in Long Beach, California, has an estimated vertical uplift of 490 ft (150 m) along its west side as based on a precise gravity survey conducted in October 1979. This strand has a northwest strike and underlies the vicinity of the intersection of Seventh Street and Pacific Coast Highway. This fault strand, as delineated by gravity, is in agreement with well data from the northern extension of the Seal Beach oil field which the survey line crosses. However, the geometry of the structural zone, as modeled from the survey, is in conflict with that of R. F. Yerkes.

This fault strand has an associated gravity anomaly of °2.25 mgal at the southern end of the survey. The anomaly begins at California State University, Long Beach, and continues southward, possibly through the southeast offshore extension of the Wilmington oil field. The anomaly is presumably based on vertical offset of Franciscan(?) basement schist against overlying Miocene Monterey Formation and San Onofre breccia. This offset causes an estimated density contrast of 0.2 g/cc across the fault at a depth, as projected from nearby well data, of about 9,200 ft (2,800 m).

A graphical regional-residual separation indicated a regional gradient 4.5 mgal/km which compares with the regional value of 3.0 mgal/km by L. L. Nettleton. The instrument used was a LaCoste and Romberg G model gravity meter with an elevation accuracy of ± 0.01 mgal.