of McKittrick, and approximately half-way between the old McKittrick field toward the west and the Elk Hills "24 Z" pool toward the east.

The discovery well, the E. A. Bender "Standard Oil Co." No. 18, in Sec. 23, T. 30 S., R. 22, E., M.D.B.&M., was spudded November 17, 1962, on an 80-acre farmout from the Standard Oil Company of California and was completed for an initial production of 312 BD of 37° gravity oil from the interval 5,612–5,672 feet. Since then, over 60 wells have been completed in the field for average production in excess of 13,000 BOPD from about 600 acres. Cumulative production to December 31, 1964, is about 8,000,000 barrels of oil and 10,000,000 Mcf of gas. Peak production was over 17,000 BD in September, 1963.

The trap for the accumulation is formed by the shale-out of the upper Miocene Asphalto-Stevens Sands on the southeastern plunge of the McKittrick Front structure. Clues to the possible presence of the reservoir were given by the trend of the sandstones in the Elk Hills "24-Z" pool, and by the presence of thin laminae of oil-stained sandstones in the equivalent shale intervals of 3 wells straddling the area and about 1½ mi. apart.

Three sandstones are present and have been named respectively the Asphalto I, Asphalto II, and Asphalto III Sands. Only the uppermost Asphalto I Sand is productive in the discovery well, the lower sandstones being wet. However, subsequent wells have found all three sandstones productive at various locations, but toward the south and east, they merge into one thick sandstone body making their separation difficult.

Structurally, the field forms an elongated structural saddle at "N" point with some shallow closure of its own. Local unconformities and successive overlap immeasurably complicate attempts to unravel the structure and stratigraphy in any great detail. Generally, "N"-point structure is valid for the sandstones, but differs from lower horizons in detail. The Olig structure above is greatly different.

The discovery of the Asphalto field has given new impetus to exploration in the southern San Joaquin Valley and is certainly a classic example of a major discovery in a highly explored area.

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(Abstract not submitted.)

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Miocene Radiolaria of Newport Bay, California

The Newport Bay radiolaria occur within the Valmonte Diatomite Member of the Miocene Monterey Formation. Radical assemblage changes through the Newport Bay sections make it possible to distinguish 3 radiolarian faunules. The basal faunule occurs through 450 feet of strata exposed on the eastern side of the bay. It consists of a radiolarian assemblage limited to a few species of smaller, unornamented representatives of the suborders Spumellina and Nassellina. Nassellina are dominant. The second faunule, recognized through 550 feet of strata, contains a diverse and abundant assemblage of dominantly large, well-ornamented species of Spumellina. Progressively poorer radiolarian assemblages, comparable to those of the lowest faunule, occupy the upper 175 feet of strata of the Newport Bay sections.

The uniform lithology throughout this section shows that the terrigenous contribution to the area of deposition remained constant. Parts of the section representing thinly laminated sediments indicate a condition of low ambient oxygen concentration near the bottom at the time of deposition.

Deposition of this section began within a restricted, shallow, ocean basin. Streams flowing into this basin were small and few in number. The basin gradually deepened and free access to the open sea was attained. The top of the section indicates a return to the shallow, restricted conditions of the lower section.

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Tidal Flat Sedimentation on Colorado River Delta

Barren inter-tidal mud and salt flats comprise a low-lying coastal plain of 2,000 sq. km. extending southward from the Colorado River estuary to near the town of San Felipe, Baja California. The region is arid and characterized by maximum tides of 10 m. Examination of surface sediments in terms of sedimentary structures, texture, composition, and color reveals a repetitious sediment zonation across the plain related to varying exposure to subaerial drying, tidal inundation, and the activity of burrowing organisms. In a seaward direction or with decreasing elevation, the sedimentary sequence includes: (1) chaotic muds and evaporites; (2) medium brown, laminated clayey silts; (3) brown to gray, mottled silty clays; and (4) gray, laminated silty clays. Borings reveal a similar sequence stratigraphically disposed beneath the mud-flats, indicating their development through depositional regression.

Seaward growth was initiated during the late stages of post-Wisconsin sea level rise when accretion of tidally supplied muds from the Colorado River out-stripped the ability of small gulf waves to rework. Subsequent up-growth has resulted in onlap of tidal muds across the Pleistocene piedmont plain toward the west. Mud supply diminishes toward the south and wave effects are thus accentuated in the upper inter-tidal zones. Waves have truncated the piedmont plain. Coarse sands derived thereby are carried northward to form elongate beach ridges which finger out into the inter-tidal muds. Limited depositional regression by strand plain development has occurred in the southern area in response to mud-flat encroachment from the north.

Supply of river suspended load has been negligible for the past 50 to 60 years. As a consequence, waves have winnowed the former poorly segregated mud-flat deposits, piling coarse mollusk remains into beach ridges and spreading very fine sands as a sheet over the inter-tidal flats. Older beach ridges, now encased by inter-tidal muds, may represent earlier periods of low supply when the Colorado River was diverted into the Salton basin toward the north.

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Detection of Tectonic Stresses by New Velocity Depth Relation

Although the existence of tectonic stresses is known, so far no practical method has been discovered to locate and determine the magnitude of these stresses. It has been demonstrated that velocity of elastic waves in a rock is a function of stress in the direction of propagation. If a block is subjected to active tectonic forces, then it is expected that the velocity of elastic waves within that block would be a function of time. This idea can be utilized to study the active tectonic regions.