Average gross thickness of the producing interval is between 400 and 500 feet. Dependent on structural position and permeability, a well may produce from one to as many as six identifiable zones in the Vedder section.

Present Vedder production in the field is approximately 3,000 B/D of 32–35° gravity crude. After completion the wells are restricted to varying rates dependent on their individual characteristics. Only the western limit of production has been established to date.

(3) GEOLOGY OF VALLECITOS AREA

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The Vallecitos syncline is a part of the San Benito trough recognized as a Tertiary seaway which connected the San Joaquin Valley area with the Tertiary seas on the west. It encompasses an area approximately 20 miles in length and 4–8 miles in width with a trend of approximately north 70° west. It lies between the Ciervo anticline on the north and the remnants of the western part of the Coalinga nose on the south. It is a relatively small intermountain valley whose floor has an average elevation of 2,000 feet. This area has been of economic interest since the Civil War when cinnabar, chromite, and other subsidiary minerals were found in this region. The New Idria Mining Company is the world's largest producer of cinnabar ore and mercury. It has been studied as a potential oil producing area since 1912 as oil seeps had been recognized in various places on the flanks of the syncline. As a channel-type seaway, the stratigraphic relationships of the Eocene formations vary greatly over relatively short distances and the general time relation between the Vallecitos and the San Joaquin Valley is obscured by the apparent development of sand bar and pseudo-deltaic deposits which developed at the point of connection. The Vallecitos syncline contains a relatively stable sequence of Pliocene, Miocene, Eocene, and Cretaceous sediments. Facies changes are extreme and stratigraphic complications are great, but, despite these handicaps, oil was discovered in commercial quantities by the Long and Hedges 1A well in June, 1955. Normal, reverse, and lateral faulting is present in all sizes and shapes with continuous movement being in evidence. Subsequently, several other operators have been successful in delineating oil pools of commercial significance. To-date, the primary reservoir is the Domengine-"Yokut" sands, with minor production from Kreyenhagen sand units. Drilling activity has continued since the discovery and probably will continue for several years to come since the complexities of the area require many bore holes with which to study the structural and stratigraphic problems.

(4) GEOLOGY OF MESCAL RANGE

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The Mescal Range, approximately 33 miles east of Baker, is in the central Mojave desert region of southeastern California. Here exposed, are rocks ranging in age from Precambrian to Recent. There are, however, no known sedimentary rocks of Tertiary age.

Paleozoic sedimentary rocks nearly 11,000 feet thick, complexly folded and faulted, are separated from granitic augen gneiss of Lower Precambrian age by the Clark Mountain normal fault. The Paleozoic formations include: Cambrian, Prospect Mountain quartzite and Pioche shale; Cambrian through Devonian, Goodsprings dolomite and Sultan limestone; Carboniferous, Monte Cristo limestone and Bird Spring formation; Permian, Kaibab formation. The Moenkopi and Chinle formations, of Triassic age, are nearly 850 feet thick. The Aztec sandstone and Delfonte dacite, of Jurassic age, aggregate approximately 1,100 feet.

During late Cretaceous time all earlier rocks were deformed by east-west compression. The west-dipping Mescal, Mesquite, and White Line faults represent major thrust faults. Other thrust faults are of an imbricate nature and are exposed on both sides of the Piute Valley. Interphased normal fault movement occurred during the same time interval, as evidenced by the Clark Mountain, Aztec, Piute, and Iron Horse faults, and the Monte Cristo fault system. Widespread zones of breccia, ranging in thickness from 500 feet to a feather edge, probably were formed by tectonic activity. Plutonic rocks of acid and intermediate composition were emplaced during the late stage of the Laramide orogeny. Erosional surfaces may exist between: the Goodsprings dolomite and the Sultan limestone, the Monte Cristo limestone and the Bird Spring formation, the Kaibab formation and the Moenkopi formation, and the Moenkopi formation and the Chinle formation.

In Tertiary (?) time a complex system of dikes, ranging in composition from rhyolite to basalt, was emplaced.

Older alluvium of Pleistocene age, blankets the lower flanks of the Mescal Range. Recent alluvium occurs in the larger stream courses and as a veneer over the older alluvium in the Shadow and Piute valleys.

Geomorphically, the Mescal Range represents a highly dissected upland terrane, which rises about 2,000 feet above a mature surface of moderate relief referred to by Hewett (1956) as the Ivanpah Upland. The maximum elevation found in the Mescal Range is 6,493 feet and is attained just north of the Piute valley on a peak cut in the Bird Spring formation.

The area is noted for the Sulphide Queen carbonate body which occurs in the Lower Precambrian basement rocks $\frac{3}{4}$ mile east of the settlement of Mountain Pass. This ore body represents the greatest concentration of rare-earth minerals known in the world. In addition, deposits of lead, zinc,

silver, gold, and copper ore are found in mineralized zones in the Goodsprings dolomite. Building stone has been quarried from the Aztec sandstone and limestone from the Monte Cristo limestone. A nominal water supply, sufficient for domestic use, is available at Valley Wells Station, Windmill, Clark Mountain Station, the Mountain Pass Mine, and Wheaton Springs.

(5) GEOLOGY AND OIL IN VENTURA BASIN EAST OF SAN GABRIEL FAULT
Otto Hackel and Roy W. Turner, Intex Oil Company

The discovery in August, 1957, of a small commercial oil field in the Ventura Basin east of the San Gabriel-Palomas Canyon fault trend has led the industry to increased interest and a flurry of exploratory activity in this area. The sedimentary rocks of the region, also a topographic basin, are bounded on the north, east, and south by mountainous masses of pre-Tertiary igneous and metamorphic rocks. On the west the area is delineated by the San Gabriel-Palomas Canyon fault trend beyond which, to the west, lies the main part of the Ventura Basin.

The oldest rocks of the sedimentary sequence are Paleocene marine clastics exposed against the northern basement mass. Uncomformably overlying the Paleocene strata is the fluviatile Oligocene Vasquez formation. Above the Vasquez with unconformable relation the Mint Canyon group of fluviatile and lacustrine origin was deposited during early to late Miocene time. A subsequent invasion of the sea from the west led to the deposition of the Modelo(?) (Castaic formation). In outcrop the Modelo(?) unconformably overlies the Mint Canyon, while along the southwest edge of the area subsurface evidence suggests interfingering with the Mint Canyon. To the north, the Modelo(?) section grades to the overlying basal part of the Ridge Basin group. Following a period of erosion, the southwest part of the area was encroached upon by Pliocene seas to deposit the Pico formation. At the edges of this Pico sea there were contemporaneously deposited the fluviatile sediments of the Saugus formation. Later in Pliocene time the sea retreated westward and the non-marine Saugus rocks blanketed the area. Prominent post-Saugus Pleistocene to recent terrace deposits are found along the main drainages and the intervening ridges.

The part of the area occupied by sediments is a broad westerly plunging syncline which has several smaller folds superimposed upon its flanks. Nearly all the anticlines plunge west or northwest with areas of critical east closure rare and insignificant. Faulting is most prominent in the pre-Miocene formations and is developed in a northeast-southwest system between the San Andreas and San Gabriel major faults. The San Gabriel-Palomas Canyon fault trend involves beds as young as Pliocene and, during a part of the Miocene, it appears to have acted as a barrier or sill to deposition.

Approximately 125 wildcat wells have been drilled in the 132 square miles of area covered by the Mint Canyon-Modelo(?)-Saugus outcrops. Of the above, 50 wells tested only the Mint Canyon formation; 50 wells tested primarily the Modelo(?) strata; and 25 wells were tests of the Pico-Saugus section. To date, one small field (Tapia) has established commercial production in the area. This field is a stratigraphic trap in as and of that part of the Saugus beds equivalent to the downdip Pico formation. Sub-commercial production has been obtained from the Modelo(?) in the Elizabeth Lake Canyon area and on the eastern edge of the Honor Rancho field. A small amount of oil has recently been obtained from Mint Canyon beds in the Bouquet Canyon area, and this formation has also demonstrated low-volume gas in several locales.

(6) GEOLOGY OF CORONA SOUTH QUADRANGLE
Cliffton H. Gray, Jr., California State Division of Mines

The Corona South Quadrangle lies in the northern part of the Peninsular Ranges. It contains the northwest end of the Elsinore trough which marks the trace of the Elsinore fault zone and trends northwestward across the center of the quadrangle. The Chino fault diverges north-northwestward from its apparent junction with the Elsinore fault near the eastern margin of the quadrangle.

The oldest rocks, those of the Triassic Bedford Canyon formation, are meta-sedimentary in character, and occur mainly in the Santa Ana Mountains southwest of the Elsinore fault. Here they have been intruded by late Mesozoic plutonic rocks of the Southern California batholith and in a few places are unconformably overlain by Jurassic(?) volcanic rocks. Northeast of the Elsinore fault is a succession of sedimentary rocks, several thousand feet thick, which includes rocks of Upper Cretaceous through Quaternary age. These units are of types found on the west in the Los Angeles Basin.

The dominant structural features are the Elsinore and Chino zones of high-angle reverse dip-separation faults and a synclinal trough which extends from the Puente-Chino Hills southeastward beyond Corona and lies nearly parallel with and northeast of the Elsinore fault. The surface distribution of Cretaceous sedimentary rocks indicates a probable minimum vertical displacement of 1,500 feet along the Elsinore fault southwest of Corona, whereas on the southeast a displacement of more than 5,000 feet is suggested by the difference in elevation of the basement complex on opposite sides of the fault. In post-Pliocene time, and perhaps throughout their history, the Elsinore and Chino fault zones have had an apparent high-angle reverse sense of movement. Large lateral displacement is not demonstrated in the mapped area. In the Corona area the Elsinore trough is probably a faulted syncline.

Mining operations, especially for clay, crushed and broken stone, and glass sand, have been