Recent Developments in Alaska
W. B. Sherman, Pan American Land and Royalty Company
J. W. Watson, Jr., DeGolyer & MacNaughton, Dallas, Tex.
New Devonian Productive Reef, Swan Hills-Virginia Hills Area, West-Central Alberta, Canada
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ABSTRACTS

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LATE MESOZOIC POSITIVE AREA IN WESTERN UTAH

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Throughout most of the eastern Great Basin major parts of the stratigraphic section are missing. In general effusive volcanic rocks of Early Tertiary age overlie strata ranging in age from Precambrian to Permian. Because sedimentary rocks of Mesozoic and early Cenozoic age are generally absent it has been difficult to interpret the geologic history of these eras. Individual units and sequences of the early Tertiary volcanic rocks have been correlated over most of the eastern Great Basin and western Colorado Plateau. These rocks provide a valuable datum for the deciphering of the structural and stratigraphic evolution of the region.

A study of the contact relationships of the volcanic datum to the older rocks indicates the existence of a linear positive element in western Utah, called herein the Sevier arch, during the late Mesozoic era. The axis of this arch trends generally northeast and is more or less parallel with the axis of the Manhattan geanticline of central Nevada and the early Cordilleran geanticline of eastern Nevada that became positive in Devonian and latest Paleozoic time respectively. The Sevier arch appears to be the third of a series of major upwarps developed by the eastward progression of the Paleozoic and Mesozoic orogenies.

It is convenient to describe the tectonic development of the Sevier arch in six stages. Stage I was represented by deposition of Triassic and Jurassic sediments westward as far as the early Cordilleran geanticline.

Stage II was initiated by linear uplift of the Sevier arch that extended from west-central Utah into southern Nevada. Material eroded from the arch was transported eastward into the Rocky Mountain seaway to form the thick clastic formations of latest Jurassic (?) and Cretaceous age.

Stage III was climaxed by regional thrusting that culminated the upwarping and folding of the previous stage. Highlands produced by this phase of the orogeny extended from southern Nevada northward at least as far north-central Utah. Erosion of these highlands resulted in deposition eastward of material that formed rocks of latest Cretaceous and early Tertiary age.

Stage IV resulted in continued erosion that reduced the region to one of mild topographic relief.

In stage V early Tertiary volcanics were deposited over the region as an extensive sheet.

In stage VI late Tertiary deformation superposed the characteristic basin and range type structure upon the structural features of late Mesozoic and early Tertiary age.

(2) GEOLOGY OF NORTH TEJON FIELD

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The North Tejon field is approximately 25 miles south of Bakersfield, 2½ miles north of the Tejon-Grapevine field, in the southern end of the San Joaquin Valley. The discovery well was the Reserve Oil and Gas Company's "Butler-Wehr" No. 67-18, completed in March, 1957, from the interval 11,850–12,200 feet. Production is from the Vedder sand of lower Miocene (Zemorrian) age. This discovery was the result of a combined geological-geophysical effort. Initial regional subsurface geologic studies indicated the possible presence of a structural bowing in the area, and subsequent seismic work substantiated this hypothesis. Shortly after the discovery, the Standard Oil Company of California obtained a 50% interest in approximately 2,000 acres surrounding the No. 67-18. Since that time, Standard and Reserve, with Reserve as operator, have drilled and completed 5 additional wells in the Vedder. Development by Reserve Oil and Gas Company is proceeding with three drilling strings.

The field is at present divided into two areas; the Main area, site of the original discovery, and the Highway area, a westerly extension discovered in April, 1958, by Richfield Oil Corporation. Indications at present point to a probable joining of the two areas as drilling continues. The structure of the field is interpreted as a northeast plunging nose, complicated to a small degree by faulting. The fault appears to control accumulation to some degree. The main controlling factor appears to be an updip permeability barrier.

Stratigraphically the area is fairly simple, the only really anomalous unit being the basalt section, which varies in thickness from 2,000 feet in the Main area to 50 feet or less in the Highway area. Production in both of the areas is from the Vedder sands. These sands are found at depths ranging from 8,700 feet in the Highway area to 12,000 in the Main area, indicating an oil column of 3,300 feet.

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
Donald M. Davis, Artnell Oil and Gas Company, Inc.

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
J. R. Evans, California State Division of Mines

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,