Tactics designed to facilitate geological interpretation involve density of lines and shot points along lines and the use of L-spreads to obtain strike and dip. Factors in the interpretation of seismic results are diagnostic unconformities known in adjacent areas, submarine coring, regional submarine topography, and data from supplementary geophysical methods.

2:25 (2) FLOOR OF LOS ANGELES BASIN[1]

J. E. Schoellhamer and A. O. Woodford, United States Geological Survey, Claremont.

The Miocene deposits of the Los Angeles Basin are between the San Gabriel Mountains and the sea, and extend from the Santa Monica Mountains to the Santa Ana Mountains. The sub-Miocene floor is largely composed of crystalline rocks of three types. Southwest of the Newport-Inglewood fault zone and in that zone the crystalline basement is made up of "Catalina schist,"[2] largely quartz and chlorite, and characterized especially by widespread glaucophane and lawsonite. The other two basement types, cropping out along the north and east margins of the Basin and penetrated in wells near these margins, are slate (and quartzose sandstone), possibly of Triassic age, and quartz diorite (and other quartz plutonites) intrusive into the slates.

In and near the Santa Ana Mountains Cretaceous and early Tertiary sedimentary rocks are intercalated between the slate-plutonite complex and the Miocene volcanic and sedimentary rocks.

The "Catalina schist" contains small masses of zoisite-bearing metagabbros but completely lack normal quartz plutonites. No gradation between the "Catalina schist" and the Triassic(?) slates has been found. The cordierite and other schists at the plutonite-slate contacts in the Santa Monica Mountains are very different from the "Catalina schist." The "Catalina schist" may be much older than the slates.

The surface of the "Catalina schist" west of the Inglewood-Signal Hill line shows great relief, from 1,100 feet above sea-level to 14,500 feet below. Elongate basement ridges trend northwest beneath the Torrance-Wilmington and El Segundo-Lawndale oil fields, somewhat less certainly beneath the Palos Verdes Hills, and considerably less certainly southeastward from the Playa del Rey oil field.

At the northeast edge of the Basin, from Pomona to Puente, the basement surface slopes southwestward about 800 feet to the mile.

The central part of the Los Angeles Basin northeast of the Newport-Inglewood fault zone has a floor that is probably far beneath the depths of 10,000–12,000 feet below sea level reached by the deepest wells. Aeromagnetic strip surveys from Playa del Rey to Pasadena and from the Palos Verdes Hills to the San Jose Hills locally give promise of contributing data on the basement surface but at present are generally inconclusive. The types of basement rock beneath the central deep are unknown, though a discontinuity within the basement has been suggested by seismic evidence.

2:45 (3) LEGAL ASPECT OF TIDELAND CONTROVERSY

William W. Clary, of law firm of O'Melveny and Myers, Los Angeles.

This talk covers the following points: (1) the three classes or types of water area involved, namely, inland waters, marginal sea, and continental shelf, and the present uncertainty about the definition and demcaration of each area; (2) the respective legal rights of States and Federal Government, so far as now determined, in each of the three water areas; also, international aspects of this problem and varying rights of foreign nations under international law in each of these water areas; (3) the present status of the Supreme Court litigation in the California, Texas, and Louisiana cases; (4) the present status of the legislation pending in Congress.

3:15 (4) THEORY OF TRANSGRESSIVE AND REGRESSIVE REEF (BIOHERM) DEVELOPMENT AND ORIGIN OF OIL WITHIN THEM

Theo. A. Link, consultant, Toronto, Ontario and Calgary, Alberta.

Part I

The established geological principle "transgression" and "regression" of epi-continental seas, the resultant sediments, together with their fauna and flora, is applied to coral-reef or bioherm-forming organisms. Bioherms which develop during a transgression are differentiated from those of a retreating sea by the associated sediments. A "transgressive" bioherm is surrounded and overlain by marine clastics deposited during submergence, while the "regressive" type of bioherm is associated with evaporites and/or other types of sediments deposited during withdrawal of the sea.

Part II

It is suggested that hydrocarbons found within coral-reef or bioherm reservoirs are in most instances indigenous, because of the obvious concentration and accumulation of organisms within

[1] Published by permission of the director of the United States Geological Survey.

[2] Name not adopted by the United States Geological Survey.

them. The porosity and permeability of coral-reef or bioherm reservoirs are attributed not only to the hollow corallites *etc.*, but also to the helter skelter accumulation of them so that, in many instances, such porosity is greater, more effective and more continuous. Partial or entire obliteration of porosity is, in part, due to infiltration of evaporites associated with the regressive type of bioherm.

3:55 (5) WESTERN CANADA SEDIMENTARY BASIN AREA
Theo. A. Link, consultant.

The Sedimentary Basin area of Western Canada which lies between the Pre-Cambrian Shield and the Cordilleran Mountain area, covers approximately 800,000 square miles. Sediments ranging from Cambrian to Tertiary are present, and of these the Upper and Lower Cretaceous, Jurassic, Mississippian, and Devonian have yielded commercial oil and gas fields. Producing zones in the Cretaceous and Jurassic are sandstones, while all of those of the Paleozoic are carbonate rocks such as reef limestones or dolomites (bioherms). Shows of oil and gas have also been encountered in the Cambrian and Triassic sediments.

The broad structural features of this vast expanse of sedimentary rocks are the Moose Jaw syncline, Sweet Grass-Battle River arch, Alberta syncline, the Foothills belt, the Rocky and Mackenzie mountains, the Great Bear-Slave Lake Basin and the Mackenzie Delta Basin area. This contribution is a brief outline of these data with examples of producing oil-field structures and stratigraphic traps.

FRIDAY MORNING, 9:30–12:00

Presiding: LOWELL E. REDWINE, Honolulu Oil Corporation, Santa Barbara
LOYAL E. NELSON, Southern California Petroleum Corporation, Los Angeles.

9:30 (1) GEOLOGY OF PLACERITA CANYON OIL FIELD
Robin Willis, Hilldon Oil Company, Los Angeles.

The Placerita Canyon oil field is developed in continental sands of Pico or Saugus age. Saturation occurs through an interval of 700 feet, with 150–400 feet of productive sand, yielding 12°–26° gravity oil.

The structure is a monocline dipping west-northwest at about 25 degrees, closed on the northeast by the San Gabriel fault, and on the south and east by minor faults. Other small faults divide the field into separate pools of varying gravity.

The proven area now covers about 560 acres, of which the intensively developed higher-gravity area (Confusion Hill) includes about 125 acres. The total reserve is estimated at 30 million barrels.

9:45 (2) GEOLOGY OF NORTH SULPHUR MOUNTAIN FIELD, VENTURA COUNTY
I. T. Schwade and Spencer Fine, Richfield Oil Corporation, Ventura, California.

The discovery well, Ojai Fee No. 35, was drilled in 1912, and completed for 100 barrels a day, 22.8° gravity, between 2,387–3,919 feet. In 1942, well No. 44 was drilled as a straight hole to the depth of 8,735 feet, and was completed in the interval, 2,425–4,357 feet. Both wells passed through a thrust fault from Pliocene into Miocene; however, as located, well No. 44 encountered only a small amount of lower Mohnian and was completed largely in older beds. The rediscovery of the field came about in 1947 with the drilling of No. 45 for the purpose of determining the attitude of the fault, and to obtain full information regarding the attitude of the beds and character of the reservoir beneath this fault. From this information a program of directed holes was undertaken to maintain a high structural position beneath the fault and to encounter a greater amount of productive section. Development proceeded east and west to the present size of approximately 1½ miles in length and slightly more than ¼ mile in width, and having twenty wells. Cumulative production to July, 1949, when the field was shut in due to general curtailment of lower-gravity crude fields in the state, has been 496,000 barrels, average gravity 19°–20°.

Structurally, the productive zone of Mohnian sands and fractured shales on the east end dips 80° toward the north, overturned; on the west end of the productive zone dips 50°–60° southward, upright. Most wells penetrate the Sisar fault (Miocene over Pliocene) and the North Sulphur Mountain fault (Pliocene over Miocene) in order to reach the productive zone.

10:00 (3) VAQUEROS FORMATION WEST OF SANTA BARBARA, CALIFORNIA
Eugene R. Orwig, Jr., General Petroleum Corporation, Los Angeles, California.

A summary of data is submitted on the Vaqueros formation in the area between Gaviota Pass and Santa Barbara, California. A stratigraphic study was made with particular regard to variations in mass properties, heavy minerals, and age.

The results of field observations and laboratory analysis have indicated maxima of thickness, sorting, permeability, and porosity between Refugio and Bartlett canyons. Mean grain size was observed to have a decreasing trend from west to east. Heavy-mineral assemblages invariably consist of titanite and black opaques, with a subordinate percentage of other resistant minerals. The under-