Announcement was made of the election of ELMO W. ADAMS, of the Honolulu Oil Corporation, San Francisco, as the fifth Association representative in the Pacific Coast district for the 2-year term ending at the close of the annual meeting of the A.A.P.G. in 1946.

Election of officers of the Pacific Section of the Society of Economic Paleontologists and Mineralogists resulted in the following changes. GEORGE C. KUFFEL was succeeded by STANLEY S. SIEGFUS, as president; and RUSSELL R. SIMONSON was succeeded by JOHN W. RUTH, as secretary-treasurer.

ABSTRACTS OF PAPERS ON PACIFIC SECTION PROGRAM

NORRIS JOHNSON, Symposium on Inclined Water Tables. Capillary-Gravity Equilibrium in Oil Reservoirs

The position of the water table around an oil or gas accumulation may be affected by various constraints, both geological and physical. In the complete absence of geological constraint, the table is still not likely to be horizontal, except where the average pore size in the sand is uniform all around the pool. If the average pore size is much greater at the north end of a pool, for example, than at the south end, the result of capillary forces will raise the water table at the south end with respect to the level at the north end. A simple picture of this effect is obtained by considering the following experiment. In a vessel of water, set up a ring of vertical capillary tubes of bore proportional to the mean grain size at each point along the ring representing the oil-water interface. The position of the top of the water columns in these capillaries will then represent the water table tilt to be expected around the pool. The paper gives the required mathematics and a numerical application to a California pool with known water table tilt.

MARTIN VAN COUVERING, Symposium on Inclined Water Tables. Kettleman Hills North Dome

Kettleman Hills North Dome oil field, discovered in 1928, occupies a long narrow anticline on the west side of the San Joaquin Valley, California. The oil field is about 15 miles long and 2 miles wide. The crest of the anticline has been eroded, leaving exposures of the underlying formations so obvious that the structure was recognized many years ago. However, inferences about the extent and position of the oil accumulation, prior to the development of the field, were wrong. The history of this field provides an excellent illustration of the growth of geologic knowledge, and is discussed at some length.

Effective January 31, 1931, a unit plan of operation was adopted by the various lessees of Government land in the field. In November, 1932, a map was drawn in an attempt to establish the position of the 7,000-foot subsea structural contour. The position of this contour was agreed on by the member companies and was accepted as defining the probable productive area. Subsequent events have only slightly modified the general opinion about position of the 7,000-foot contour, but the productive area has proved to be substantially different than was originally believed. Development of the field, including the drilling of unproductive outpost wells, has demonstrated that production extends below the 7,100-foot subsea contour on both the northwest plunge and the northeast flank, while on the opposite plunge and flank, it reaches only about the 6,500-foot subsea contour. The latter flank is much the steeper.

What has caused this inclination? Various reasons are suggested, some of which are not original with the author. 1. Remnants of a dissected peneplain suggest a slight warping of the structure after accumulation had occurred following the main folding in middle Pleistocene time. An inference is drawn that cementation of the sands at the oil-water interface had prevented fluid readjustment. 2. Since the southwest flank is steeper than the northeast, the strata on that flank could have been subjected to more compression and alteration, and have caused the permeability here to be reduced as compared with the opposite flank. 3. The presence of a much higher hydrostatic head on the mountainward or southwest flank as compared with its valleyward counterpart has also been offered as an explanation. In this connection, it has been argued that the difference in specific gravity of the oil and water is not sufficient, with a 600-foot hydrostatic head, to overcome the obstacles of surface tension, friction, and cementation on the high side of the water table. 4. Capillary-gravity action has also been considered a factor. 5. Finally, it has been suggested that the northeast flank had a much greater drainage area from which to draw its oil supply than did the southwest flank.

The fact that the anticline is *en échelon* with the adjoining structures at both ends, suggests that the forces causing this condition may have had a longitudinal component that could have tilted the north dome structure northward. Other structural and stratigraphic conditions in the field which might bear on the problem of an inclined water table are discussed; and questions are raised as to how much the genesis and migration of petroleum might be involved in a possible solution of the problem.

JUDSON L. ANDERSON, Petroleum Geology of Colombia, South America

As a petroleum producing country, Colombia ranked 8th in world production in 1940. Of the South American countries, Colombia is second to Venezuela, whose output is nearly ten times as great, and slightly ahead of Argentina. At least six petroliferous provinces may be recognized in Colombia. They are the Magdalena Valley, the southwestern basin area of Lake Maracaibo, the plains or "llanos" area in the southeastern part of the country, the coastal area of the Caribbean, the Goajira Peninsula and the Pacific coast region. The most important producing areas at present are the middle Magdalena Valley and the southwestern Lake Maracaibo area. Travel in the country is difficult except in the uplands where most of the roads are located. The native language is Spanish, English being spoken only sparingly.

Pre-Cretaceous rocks are known to occur in the Cordilleras Oriental and Central and also in the Llanos area, but are of no importance in the production of petroleum. Cretaceous limestones and shales are extensively developed east of the Central Cordillera and are highly petroliferous. Cenozoic deposits are found in the intermontane valleys, in the Llanos area and along the Caribbean coast. In the middle Magdalena Valley, there are important reservoir beds of petroleum.

Large overthrusts are characteristic features of the Magdalena Valley. They are also known to occur in the Llanos area in the valley west of the Cordillera Central and in the southwestern Lake Maracaibo basin area. In the Magdalena Valley and in the southwestern Lake Maracaibo area petroleum occurs on faulted anticlines. In the coastal region sharp anticlines, with some faulting, are known. Oil and gas seepages and mud volcanoes are of common occurrence. Little is known of the structure of the Goajira Peninsula and the Pacific Coast areas.

Production comes from Oligocene and Eocene sands in the middle Magdalena Valley. Two structures, Infantas and La Cira, produced all the oil of this region up to about 1943. Two new fields have been added to the above producers. The Barco area, located in the southwestern Lake Maracaibo basin, obtains its oil from the Cretaceous and Tertiary on faulted anticlines. In the Cesar Valley, located in the lower Magdalena Valley area, production of high gravity oil from Oligocene limestone has been reported in new wells.

BEN M. PAGE, Some California Tar Sand Deposits

The United States Geological Survey is mapping some of the California tar sand deposits that may be suitable for large-scale surface mining. It is contemplated that in some