

carried on since the late nineteenth century. Repeated though unsuccessful attempts have been made to find petroleum.

Records indicate 15 wildcat oil wells have been drilled within the quadrangle since 1925. Of these wells, 12 were put down in the period 1949-56. Several wells may have encountered non-commercial gas and oil shows, but there has been no sustained production.

(7) FINANCING OF FUTURE EXPLORATORY COMPANIES

R. G. Greene, Great Basins Petroleum Company

It is assumed that the spirit of free enterprise in the United States will provide favorable environment for the formation of many new oil and gas companies in the years ahead. It is further assumed that many petroleum geologists and engineers have or will develop the desire and ambition to play the part of entrepreneurs in the oil and gas industry. The contents of this paper should prove helpful to a majority of technical men whose experience in public financing is limited.

(8) OIL BASINS OF PERU

Irving T. Schwade, Richfield Oil Corporation

The principal oil basin of Peru, confined between the Andes and the Pacific Ocean, is a part of the long narrow belt (750X50 miles) of chiefly marine Tertiary sediments extending from northern Peru to western Colombia. Oil is produced on the Talara-Negritos, Lobitos, and El Alto uplifts from innumerable normal fault traps, which appear to have developed due to differences in basement density and/or rigidity rather than tectonic folding. The faults reflect the persistent tensional stress which prevailed from early Tertiary to early Quaternary. The area produces about 50,000 b/d of 37° gravity oil; cumulative production to date is about 600 million barrels.

The other oil-producing area of Peru is the heavily jungle-covered, scarcely explored Marañon Basin, which occupies the upper Amazon tributary drainage east of the Andes. This basin is a part of the sub-Andean trough, an elongate downwarp which persists from eastern Venezuela, through eastern Colombia, Ecuador, Peru, Bolivia, into western Argentina, lying between the overriding Andean uplift and the Guiana and Brazilian shields. The basin contains up to 12,000 feet of Tertiary and Quaternary fluvial and lacustrine sediments which mask the Mesozoic and upper Paleozoic objectives. From outcrops and seepages in the Andean foothills, these objectives should constitute substantial reservoir and source rocks. The Ganso Azul and recently discovered Maquia fields, lying on the southwestern margin of the Marañon Basin in the belt of surface folds, are the only producing structures in the basin to date, with a daily production of less than 3,000 barrels, and an ultimate yield of probably less than 15 million barrels.

Attention is directed to the many geological similarities exhibited by North and South America in structural framework, tectonics, paleogeography, and stratigraphy.

(9) CALIFORNIA OFFSHORE OIL, PRESENT AND FUTURE

Francis J. Hortig, California State Land Commission

1. A general historical review of California coastal tide and submerged land development starting with the first tideland well in 1896.

2. General review of past production, locations, techniques, and magnitude—which have totalled 312,000,000 barrels and \$126,000,000 State-lease royalty payments through December, 1957.

3. Summary of present problems in future leasing and development. Suggestions as to future requirements and some possible development techniques.

(10) EOCENE GORGE IN NORTHERN SACRAMENTO VALLEY

J. D. Frick, T. P. Harding, and A. W. Marianos, Humble Oil and Refining Company

A prominent erosion-and-fill feature has been observed in the subsurface of the Sacramento Valley in Northern California. The feature, which has been termed a "gorge," extends for approximately 40 miles along a narrow, sinuous trend that is generally parallel with the course of the Sacramento River.

As much as 2,000 feet of Upper Cretaceous section has been removed by erosion and the trough later filled with sediments that have been correlated with the Eocene B-2-B-4 zones of Laiming.

It is suggested that submarine erosion of this thick section of Upper Cretaceous deltaic sediments was initiated by the uplift of adjacent land areas with consequent rejuvenation of the stream. A filling of the trough was started as the sediments built up on the basin floor and the marginal land-mass had been reduced by erosion. Foraminifera, as well as certain textural features of the sediments, indicate that the entire sequence was laid down in a marine environment. There is no evidence in the fill or in the underlying beds that subaerial processes were involved.

This feature is important in exploration in that natural gas is present in sediments within the "gorge" as well as being trapped in Cretaceous sediments truncated by the "gorge."

(11) GEOLOGIC RECONNAISSANCE OF ALTURAS AREA, NORTHEASTERN CALIFORNIA

T. E. Gay, Jr., and Q. A. Aune, California State Division of Mines

To augment the California Division of Mines State Geologic Map project, photogeologic map-