deposition was accompanied by compressive forces which folded the younger beds, but which were absorbed by the top few hundred feet of Miocene shale. This produced an upper structure which has no relationship with the structure in the lower beds. Oil-saturated sands are found in the Pliocene at structurally high positions along pinch-out lines.

9. BURDETTE A. OGLE, Wm. Ross Cabeen and Associates, Denver. Geology of the Eel River Basin, Humboldt County, California.

Eel River Basin, a westerly trending Cenozoic basin in Humboldt County, was the site of deposition of 13,000 feet of dominantly marine upper Miocene to Recent clastic sediments.

Pre-Tertiary formations in the region include the Franciscan and Yager formation (Cretaceous). Deposition of the Wildcat group on an eroded surface cut on Franciscan and Yager rocks began in Mohnian time with the basal beds of the Pullen formation (Mohnian-lower Pliocene). The Pullen, 600–1,000 feet thick, locally has a 200-foot thick basal sand, but is dominantly made up of massive diatomaceous mudstone. Overlying the Pullen disconformably is the Eel River formation (600–2,000 feet) which is characterized by glauconitic sandstones and dark gray mudstones containing a Repettian fauna. From 3,000 to 6,000 feet of middle to upper Pliocene mudstones, siltstones, and sandstones of the Rio Dell formation overlie the Eel River formation and overlap onto pre-Tertiary rocks in the northeastern part of the basin. Numerous thin, friable, permeable sands are present in the middle part of this unit; gas is produced from them in the Tompkins Hill gas field. Gradationally above the Rio Dell is the Scotia Bluffs sandstone, an upper Pliocene shallow marine to non-marine massive sandstone unit, 1,000–2,000 feet thick, noted for forming spectacular cliffs. Carlotta formation's non-marine massive conglomerates, sandstones, and claystones grade up from Scotia Bluffs sandstone. This 500–3,000-foot series of beds ranges in age from upper Pliocene to Pleistocene.

Rapid changes take place in thickness, character, and distribution of these units. Sedimentary and faunal evidence indicate deep-water deposition in the early history of the basin with gradual shallowing and eventual regression of the sea by late Pliocene.

Faulting probably aided in the early development of the depositional trough. The principal structural features of the basin are the major Eel River syncline and smaller anticlines on the north and south, and the northwest-trending Little Salmon fault.

10. OLAF P. JENKINS, California State Division of Mines, San Francisco. Status of Geological Mapping in California.

During revision of the 1938 edition of the State Geologic Map, the Division of Mines has examined and compiled available geologic mapping, published, and unpublished. Thirty topographic sheets, by the Army Map Service, are to serve as the base for the revised map. The first group of 8 of these sheets, in southern California, is in press. Geologic mapping which may be considered adequate for the 1:250,000 scale adopted for the new map covers over half (57%) of the state's area; 70% of this has been published. The most completely mapped provinces are the Sierra Nevada and the central and southern Coast Ranges. About 70% of the Sierra Nevada is covered by adequate available maps, and possibly 90% of the central and southern Coast Ranges has been adequately mapped, the latter mainly by petroleum geologists. Only 27% of the Mojave-Colorado desert is adequately mapped.

Geologic mapping in the state is progressing rapidly by the U. S. Geological Survey, the universities, the State Division of Mines, and other geologists. Approximately two-thirds of the geologic mapping in California published since 1940 has been published by the Division of Mines. The Division in September, 1953, had in press 6 quadrangle geologic maps, and field mapping has been completed in 25 additional 15-minute quadrangles. The U. S. Geological Survey, in cooperation with the Division of Mines, has been mapping mineralized areas in the state, and, in addition to the cooperative investigations, is mapping in connection with several mineral commodities, including the salines of the Mojave Desert; this last is to yield a reconnaissance geologic map of the Mojave within two years. The Survey is also reconnaissance-mapping 15,000 square miles in northwestern California. Several universities are sponsoring mapping projects, including the University of California in the high Sierra Nevada, Sierra Nevada foothills, the Salinas Valley, and Diablo Range; California Institute of Technology in the San Jacinto and Avawatz mountains; University of Southern California in the southern Coast Ranges and Peninsular Ranges; and Stanford University in the east Shasta district, Sierra Nevada foothills, and Santa Lucia and San Bernardino mountains.

The Division of Mines encourages the cooperation of geologists in furnishing information on geologic mapping in progress in the State and welcomes their inquiries.

11. EDWARD A. HALL and GERALD H. RICKELS, Union Oil Company of California, Santa Paula. Oakridge Oil Field, Ventura County, California.

The Oakridge oil field is located atop the Oakridge Mountains 2 miles east of the Torrey Canyon oil field and 3½ miles southeast of the town of Piru.

The producing zone was discovered by Union "Oakridge" 1–3 ("Simi" 17) which recovered 1,700 feet of clean 23° oil on a one-hour, 8-minute formation test from the interval 2,851 to 2,926 feet. As "Oakridge" 1–3 prospected ahead, "Oakridge" 2–10 was drilled and completed in the "Luisian" zone, pumping 390 B/D, 8% cut, 21.7°, 129 Mcf. from the interval 2,852–3,298 feet. Potential productivity of the "Luisian" sands was first indicated by oil showings cored in Union Wildcats "Simi" 10 and 15. The discovery well was located to test these showings in a higher structural position.

The generalized section is as follows: lower Mohnian shale, Luisian siltstone, Luisian sand, Topanga and Vaqueros sand, Sespe sand.

The so-called "Luisian" production comes from foraminiferal Luisian sands above an angular unconformity and from unfossiliferous marine sands below which are thought to be Topanga and Vaqueros undifferentiated. The most prolific wells are down structure near the discovery well, since the producing sands become thinner and siltier up structure to the north and west. A troublesome wedge of intermediate water sand directly underlies the unconformity, with increasing thickness north and west.

Oil accumulation is on an asymmetric, unfaulted, easterly plunging nose, with reason for closure on the west unknown, but believed to be stratigraphic. Dips on the steep north flank average 60°–70°, on the south flank 30°–35°. In the west end of the field the east plunge is gentle, becoming more abrupt on the east. This simple structure lies beneath the folded Santa Susana thrust, with a complex folded and faulted Miocene section above the fault as seen on the surface.

The field is being actively developed and 33 wells produce approximately 3,800 B/D. No dry holes have been drilled, and no definite limits proved, except at the north. A shallow low-pressure oil sand discovered in the east end of the field by Union "Oakridge" 11–3 remains for further evaluation.

12. RICHARD H. JAHNS, California Institute of Technology, Pasadena. G.S.A.—Division of Mines Volume on the Geology of Southern California, Edition of 1954.

A 3-day field trip, two 2-day trips, and three 1-day trips are being planned as parts of the program for next year's annual meeting of the Geological Society of America, scheduled for Los Angeles in November, 1954. Guidebook coverage of the usual type is in preparation for these excursions, mainly by the trip leaders and by members of the State Division of Mines. In addition, it has seemed desirable to supply more general geologic data than are included in most annotated road logs, and to this end a volume on the geology of southern California is being prepared for publication by the Division of Mines.

Organization of the book was the work of a 4-man committee, and was facilitated by advice and suggestions from numerous representatives of industry, State and Federal surveys, and academic institutions. The volume is intended to be a broad sampling of geological features and thought, as they relate to the southern California region, and its contents reflect an approach that is partly geographic and partly tropical. Emphasis has been placed on a wide variety of contributions by investigators qualified to make authoritative presentations and interpretations of data.

The major sections of the book deal with physical geography, general geology of the natural provinces, historical geology, geologic structure, geomorphology, mineralogy and petrology, hydrology, oil and gas, mineral deposits, and engineering geology. Some of the individual contributions are general in scope, and others deal with specific areas or problems; many contain information hitherto unpublished. Supplementing the main part of the book is a group of approximately thirty map-sheets of selected areas; each sheet includes a geologic map, sections, and a brief text. The entire volume comprises 108 contributions from 90 authors.

13. JOHN LOGAN, U. S. Bureau of Reclamation, Fresno. Groundwater Geochemistry in Southeastern San Joaquin Valley, California.

South of the Kern River and east of the line Bakersfield-San Emigdio Creek, ground-waters pumped for irrigation occur in several chemical and geographic types. These are: (1) Kern, (2) Caliente, (3) El Paso, (4) San Emigdian, (5) Grapevine Transition, (6) East Bakersfield, (7) Kern Mesa, (8) Saline.

The first four comprise the main water-body and underlie most of the area; they are chemically related to the recharging streams. Type 5 may represent a wide interface between 3 and 4.

The remaining types are not related to their local streams. Types 6 and 7 are complexes that can not yet be subdivided; structural controls are important to their occurrence. Type 8 represents natural contamination of the groundwater reservoir by petroleum brines.

Abnormal quantities of boron northeast of Arvin are superimposed on the Caliente type by additions of juvenile waters. Pollution by the petroleum industry is not now significant. Generally, vertical zoning of the chemical types is not pronounced. Although most of the groundwaters are eminently suitable for irrigation, some are not of desirable quality for that purpose.