ments. Possible other deep-seated intrusives in the area domed overlying sediments, in some cases resulting in gas accumulations.

The Buttes gas field produces from lenticular Cretaceous sands in a trap which may have been further improved by the Buttes intrusion. Whereas the surface expression of the plug and distorted bordering sediments occupies an area of 20 square miles, the area beneath the surface which is influenced by this volcanic disturbance is at least 120 square miles.

J. P. WOODS, Atlantic Refining Company, Dallas, Texas
Composition of Reflections

When all traces on a seismic-reflection record show about the same deflection at about the same time, the line-up is marked and called a seismic reflection. An important fact is forgotten. The fact is that the reflection seen on the record is almost invariably a composite of the various reflections caused by a set of closely spaced reflecting layers. When the arrangement of the layers in the set changes, the various reflections add together in a different way, and the character of the composite reflection seen on the record changes.

A series of artificial seismic records has been made to show this composition of reflections. The records were made by connecting a standard reflection seismograph to an acoustic model. The model was a 300-foot length of steel pipe with input and output transducers at one end. Records were made for a wedge, a pinch-out, a complex of thin layers, a sand bar, layers corresponding with well resistivity logs, and a regular layer system.

GEORGE C. HEPBURN, JR., Schlumberger Well Surveying Corporation
Geological Approach to Electric-Log Analysis

Use of electric-logging methods to gain more geological information involves knowledge of the lithologic conditions which affect logging measurements. Porosity, interstitial water resistivity, water saturation, permeability, and amount of shale have a definite relation to the recorded curves.

Recent advances in interpretive techniques make possible the determination of water saturation, porosity, and producible oil index by logging methods, even in shaly sands. Qualitative permeability is indicated by the SP curve or microlog-caliper, and under certain conditions can even be determined quantitatively.

Numerous examples are presented which indicate that every permeable formation, no matter how low its resistivity, should be considered potentially oil-bearing until a complete log interpretation has been made.

WILLIAM CARRUTHERS GUSSOW, consulting geologist, Calgary, Alberta
Problems of Oil Migration

Migration and accumulation of hydrocarbons conform with the simple laws of nature and logic. These governing principles are reviewed, both in the physical sense and in the sense of geologic time, and particularly from the standpoint of such concepts as distant source and regional migration, migration paths, differential entrapment, evolution of oils, and the significance of tar belts, interstitial or non-producible oil, synclinal oil, etc.

ROBERT B. SCOTT, The Texas Company, Bakersfield
Geology of North Arvin Field, Kern County, California

The North Arvin field is on the east side of the southern San Joaquin Valley approximately 13 miles southeast of Bakersfield. Production is from the non-marine (Pliocene-Miocene) Chanac formation and the marine (upper Miocene) Santa Margarita sand. A sub-commercial quantity of oil has been produced from the fractured metamorphic Basement Complex (Jurassic?). The thickness of sediments overlying the basement ranges from 5,000 to 7,000 feet, with the depth of wells averaging approximately 6,000 feet. The oil accumulation occurs on a regional southwesterly dipping homocline with closure effected primarily by the lensing of sands and to a lesser degree by faulting. The field was discovered on July 19, 1951, and has undergone almost continuous development from that date.

ROBERT H. PASCHALL, Hancock Oil Company, Ventura
Fourth Dimension in Oil-Trap Analysis

The time is past in which oil geologists needed prompting toward the search for stratigraphic as well as structural traps. However, the contemporary search for oil traps remains primarily a study in geometry. The prime requisite of a wildcat is that it be on a more or less provable closure, which may be either structural or stratigraphic in nature.

California, like many other oil-producing areas, has yielded a depressing collection of non-productive closures. It is evident that there must be a dimension, other than the three of geometry, which is critical in the formation of an oil-producing trap. It is suggested that the fourth dimension is one of time.

Field examples are afforded of two areas where presently mappable structural closures have been