

Huygens' principle in reverse. Targeting between complementary wavefronts provides a solution to a reversed refraction profile that is independent of the refractor velocity. The agreement between two one-way solutions imposed thereon proves correctness. Reversed refraction profiling is the only geophysical method affording an interpretation which can be proved correct on the data alone. However, application of this fact is limited by recording conditions and velocity complexities.

WILLIAM SCHNEIDER, MILO M. BACKUS, JOHN P. BURG, EARL C. WISLER, Geophysical Service, Incorporated: Wide-Band Ghost Elimination

A new technique has been developed which makes it possible to stack two or more similar shots from different depths in such a fashion that "ghost" energy may be eliminated over a very wide frequency range without significant signal distortion. The method requires knowledge only of the relative moveout between primary and ghosted energy from one shot to the next, and requires that the ghosts from each shot have similar character. By combining shots to obtain a ghost-free seismogram, and subsequently obtaining a statistical estimate of the optimum linear filter for changing the ghost-free record into one of the original shots, it is possible to obtain an estimate of the impulse response of the near-surface layering, i.e., the cause of the ghosts.

The method is described in terms of its application to synthetic examples. Examples of its application to actual seismic data illustrate its practical effectiveness.

CALVIN H. STEVENS, University of Southern California: Permian Facies Relationships in Eastern Nevada

Lower and Middle Permian formations between Confusion Range, Millard Co., Utah, and Dry Mountain, White Pine Co., Nevada, have many distinct facies, but all pre-Kaibab Permian rocks may be referred to five formations. The stratigraphic succession at Illipah Gorge comprises Reipe Spring limestone, Reipe-town sandstone, Pequop formation, and Loray formation. In the Confusion Range, Butte Mountains, and Ely area, Pequop and Loray formations are generally recognizable, but no distinctive boundary for mapping purposes can be recognized. In these areas, the Arcturus formation is used to designate the entire section between Reipe-town sandstone and Kaibab limestone. Reipe Spring limestone is rather uniform in its physical characteristics, although it becomes somewhat arenaceous at Dry Mountain and silty in the Butte Mountains. A limestone-rich facies near Divide Spring, and mud-

stone rich facies at Dry Mountain represent the Reipe-town sandstone. The lower Pequop formation consists of interbedded calcarenite and sandstone at Illipah Gorge, but at Dry Mountain an almost entirely mudstone facies is present. In the Ely area and Confusion Range this member is represented by interbedded limestones and sandstones of the lower Arcturus formation. Massive, crinoidal, and fusulinid-rich limestones of the upper Pequop formation at Moorman Ranch are represented in the Ely area by interbedded thin limestones and sandstones of the middle Arcturus formation. The upper Arcturus formation in the Ely area, Butte Mountains, and Confusion Range comprises thin interbedded red and yellow sandstones and dark gray limestones similar to those of the Loray formation in the northeast part of the Illipah Quadrangle.

V. S. TUMAN, Stanford University: Elastic Coefficients of Porous Rocks as a Function of Effective Stresses

An elastic energy pulse is generated in a pressure chamber (triaxial system) containing a cylindrical rock sample. The dynamic elastic coefficients of the porous rock are determined by analyzing the first arrivals and the later events of elastic energy. The pulse durations are less than one microsecond. By changing the effective pressures in the triaxial system the elastic coefficients of the rock sample are varied. The variation of the elastic coefficients have been measured as a function of effective stresses.

N. D. WATKINS, Stanford University: Application of Paleomagnetism to Fault Problems in Southern Oregon

The Miocene lavas of the southern part of the Columbia Plateaus are exposed by major northerly trending faults. In such terrane, normally and reversely magnetized zones of lavas could be expected to provide a method for broad stratigraphic correlation. As a result of a large-scale paleomagnetic survey, major sections in the region have been observed to possess only a single polarity.

During the summer of 1962, however, some fine and apparently rapid systematic variations of the direction of the ancient ambient magnetic field were observed within zones of both normally and reversely magnetized lavas. These systematic variations are likely to yield an accurate tool for correlation across the faults. Should oil-bearing sediments be sought beneath the lavas, the throws of the faults will be of major importance, and paleomagnetism could thus assist significantly in exploration in this area.

## 1964 A.A.P.G. GRANTS-IN-AID OF RESEARCH

MELVIN J. HILL<sup>1</sup>  
Pittsburgh, Pennsylvania

The American Association of Petroleum Geologists will continue in 1964 the program begun in 1956 for support of petroleum research. Grants-in-Aid appropriated from the Association's Research Fund will be made available to selected scientists conducting research in the United States in fields of interest to the petroleum geologist. The program is administered by the Association's research committee through a specific subcommittee, and applications for grants will be re-

ceived from September 1, 1963, until January 1, 1964.

*Aims of program.*—The primary aim of the program is to stimulate research by graduate students and faculty members which is likely to yield knowledge of significance in relation to the geological facets of exploration and exploitation problems. Support is intended for theoretical, experimental or empirical studies aimed at the establishment of principles or the development of methods as distinguished from studies which involve only data-gathering or problem-solving with known techniques.

*Fields of interest.*—While admitting the difficulty of

<sup>1</sup> Chairman, A.A.P.G. research committee. Gulf Oil Corporation.