Consultants to Panel
J. L. WILD, Univ. Western Ontario, London, Ont.
R. A. HOPPIN, Univ. Iowa, Iowa City, Ia.
J. C. PALMQUIST, Monmouth College, Monmouth, Ill.

2:00–5:00 P.M. SESSION V. NEW TECHNIQUES AND DISCOVERIES IN PETROLEUM GEOLOGY

Chm.: J. A. DOWNING, Canadian Devonian Petroleum Ltd., Calgary, Alta.

Co-Chm.: A. D. BAILLIE, British American, Calgary, Alta.

1. Telluric Currents and Their Use in Petroleum Exploration, K. VOZOFF,* and R. M. ELLIS, Univ. of Alberta, Calgary, Alta.
2. Size Distribution of Oil and Gas Fields, G. M. KAUFMAN, Mass. Inst. of Technology, Cambridge, Mass.
3. Digital Seismic System in Petroleum Exploration, R. C. DUNLAP, JR., Geophysical Services, Dallas, Tex.
4. Exploration Potential of Remote Sensing, W. A. BREWER, Univ. of California, Berkeley
5. Techniques of Exploration for Buried Landscapes, RUDOLF MARTIN, Martin & Assoc., Calgary, Alta.
6. Two Level and Dual Level Aeromagnetic Surveying, H. E. WARD, JR., Micro-Magnetics Assoc., Houston, Tex.

LOUIS I. BRIGGS, *Chm.*
JAMES R. KRAMER, *Co-Chm.*
A.A.P.G. Technical Program
Univ. of Michigan
Ann Arbor, Mich.

LECTURE TOUR ABSTRACTS

(Concluding tours arranged by AAPG Distinguished Lecture Committee, James P. Spillers, chairman)

PEACE RIVER ARCH

GEORGE DE MILLE, Imperial Oil Ltd., Calgary, Alberta, Canada. Tour begins early in March.

The Peace River arch is a pre-Devonian structure 250 miles long which was modified by post-Devonian tectonic events. It is situated in the west-central part of the Alberta basin in Western Canada.

The structure consists of Precambrian and Cambrian rocks which were tectonically elevated and formed an island in the Devonian seas. During the time of Devonian sedimentation it contributed arkosic quartz sandstones to the surrounding area and provided a platform on which a major barrier reef complex developed. The island was enveloped in sedimentary rock by the close of Devonian time or very soon thereafter.

The arched area became slightly negative during Mississippian time and in late Mississippian time subsided rapidly. Structural failure in the crestal part resulted in a horst and graben complex. Downfaulted areas are filled mainly by late Mississippian and younger clastic rocks beneath a pre-Mesozoic unconformity. The configurations of deeply buried rocks were altered by these tectonic movements which depressed the pre-Devonian surface. A very moderate negative condition prevailed in the area of the arch until about Middle Cretaceous time, after which the rate of subsidence was common to most of the Alberta basin. Thick upper Cretaceous and Tertiary beds were deposited.

The Laramide orogeny resulted in uplift and differential warping. Large quantities of Cretaceous and Tertiary rock were subsequently removed by erosion. The Alberta basin tilted westward and the area of the arch upwarped in such a manner that the ridge on the pre-Devonian basement nearly achieved its original amplitude. It formed a westward-plunging nose on the basement surface.

The present westward dip results in large stratigraphic and structural traps in sandstones and reefal carbonates along the east (updip) side of the arch. On their discovery, major hydrocarbon accumulations were anticipated but to date only small pools have been found despite intensive search. The lack of major accumulations may be due to one of three factors or combinations of them: (1) lack of source rocks surrounding the most important reservoir systems, due to a particular pattern of sedimentation; (2) loss of hydrocarbons up the slope of the island during a lengthy period of nondeposition during Upper Devonian time; (3) lateral and vertical dispersal of hydrocarbons into numerous small pools in many reservoir systems and structural complexes during times of tectonic activity.

The failure to find large oil reserves on this great paleotectonic structure has been a costly disappointment to the Canadian oil industry.

COMPARISON OF RECENT SHORELINE SEDIMENTATION WITH STRATIGRAPHY OF UPPER CRETACEOUS OIL FIELDS, ROCKY MOUNTAIN AREA

ROBERT J. WEIMER, associate professor, Colorado School of Mines, Golden. Tour begins early in March.

The recognition of the shoreline of a marine basin is one of the most important tasks facing the stratigrapher. Determining the position and trend of the shoreline aids in lithofacies studies and is the basis for the art of paleogeography. An important depositional feature of some modern shorelines is the barrier island on which barrier bar sands are accumulating. The barrier bar deposit is characterized by a narrow linear, well sorted porous and permeable sandstone, beach structures and littoral fauna on one flank, beach ridges, eolian deposits, and other minor features. Sedimentation along the central Georgia coast illustrates the factors which disrupt normal barrier island development and cause abrupt termination of barrier bars. A knowledge of these factors is important to the trend-pursuing petroleum geologists.

By using lithologic and biologic criteria developed from Recent sediment studies, barrier bar sands can be demonstrated as common shoreline deposits in the Cretaceous of the Rocky Mountains. These sands are important petroleum reservoirs and are prime targets in the search for stratigraphic traps. Surface and subsurface studies indicate that the newly found petroleum accumulations on the Wamsutter arch, southern Wyoming, are in barrier bar sands of Late Cretaceous age. The trend of these shoreline deposits is nearly perpendicular to the axis of the broad east-plunging anticline. The updip permeability seal on the trap is the change from barrier bar sands to impermeable swamp and lagoonal sediments. Because barrier bar sands represent less than 1 per cent of the Cretaceous strata, they are elusive targets in petroleum exploration.

GEOCHEMICAL EXPLORATION TECHNIQUES IN U.S.S.R.

JOHN M. HUNT, chairman, Department of Chemistry and Geology, Woods Hole Oceanographic Institution, Massachusetts. Tour begins early in April.

Geochemistry is widely used in field operations, and represents about 25 per cent of the petroleum exploration research in the U.S.S.R. Three approaches are used: (1) subsurface prospecting which included mudlogging,