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,

hydrocarbon distributions in sediments, and geochemical criteria for indicating oil such as the presence of organic compounds in waters; (2) surface prospecting which is concerned with rates of diffusion and filtration of hydrocarbons through sedimentary rocks, microbiological detection of hydrocarbons, and the evaluation of radiometric, organic, and inorganic anomalies of the surface; (3) studies on the origin of petroleum and the recognition of favorable oil forming environments.

About 90 per cent of the 300 geochemical field parties are doing subsurface prospecting. The other 10 per cent are engaged in surface surveys, and these are on a research basis. They are limited to arid areas of shallow young sediments such as around Volgograd, Baku, and Turkmenia. In contrast, about half of the geochemical research at 30 institutes or more in the U.S.S.R. involves surface prospecting techniques. The Soviets hope to develop a practical surface method that can be combined with geology for use in stratigraphic prospecting.

In general, the Soviet scientists seem to be using more manpower and developing more geochemical parameters for field use than U. S. oil companies. The established facts of petroleum geochemistry, such as the organic nature of source beds and the detection of hydrocarbons in sediments and subsurface waters, are understood and taken into account in exploration programs. Thus the practical application of geochemistry in exploration is more widespread than in the U. S.

PROFESSIONAL CERTIFICATION FOR THE A.A.P.G.[1]

J. C. SPROULE[2]
Calgary, Alberta, Canada

The following presentation is the fourth draft of a paper that was originally entitled "Professional Certification and Registration and the A.A.P.G." The first draft was circulated to the members of the Executive Committee and a representative group of other senior members of the Association. The second draft was circulated among the members of the Executive Committee and to all District Representatives, all A.A.P.G. Committee Chairmen and representative senior members of the Association. The third draft was originally intended for similar circulation plus all affiliated society presidents, but due to time limitations was not given that treatment. The fourth and final draft is at this time submitted to the Editor of the *Bulletin* for publication and at the same time is being given the circulation originally intended for the third draft. It is anticipated that any significant additional comments and suggestions made can be taken care of by publication in subsequent issues of the *Bulletin*. In addition to the above circulation this paper has been presented or is being presented by the author, by other members of the Executive Committee, or by B. M. Hanson, chairman of the Professional Standards Committee, to all those affiliated societies who have indicated an interest in having the subject presented. The object of the wide circulation given the paper on a personal basis, prior to publication, is to promote discussion and to encourage criticism, in order that the membership will be as fully informed as possible before the matter is presented to the Business Committee at the 1964 Annual Meeting, for their consideration and possible subsequent referral by ballot to the membership at large.

There has been a considerable amount of discussion over the past several years given to the idea of the professional certification and registration of geologists, somewhat similar to that which is already widely practiced by engineers and other professional groups, such as architects, lawyers, doctors, and dentists. Much of the discussion has been the spontaneous result of local situations in which some type of registration has become desirable for reasons of ethics or for purposes of normal professional practice; too much of it has been the result of well intended but personal beliefs based on insufficient knowledge of the over-all problem.

One basic problem has been that geologists as a group are, whether they realize it or not, more interested in their own practice of geology than they are in their connection with other related sciences and professions, in their own public image, or in their responsibility to their employers, whom we shall refer to collectively as "the public." As a result, other professions have evolved to more advanced degrees of development than has the profession of geology as such. This is no adverse reflection on geologists but is rather a favorable commentary on our devotion to the subject, as a result of which we are accustomed to pay but little attention to our daily professional and other outside relationships with closely connected geological and other scientific fields of practice. The net result of this partial neglect of an important phase of our professional lives is that the public image of the geologist is deficient.

[1] Manuscript received, February 17, 1964. Approved by the Executive Committee of the A.A.P.G.

[2] President, A.A.P.G.