EXHIBIT XXIX. REPORT OF RESOLUTIONS COMMITTEE

Whereas, the American Association of Petroleum Geologists during the past year has continued to grow in numbers, in influence, and service to the geological profession and petroleum industry, and *Whereas*, the administration of the Association's affairs has required much time and effort by many individuals,

Be It Resolved that we hereby express the thanks and appreciation of the American Association of Petroleum Geologists to the following.

1. The executive committee of the Association, and especially to the retiring president, Lewis G. Weeks, for capable and aggressive leadership in advancing the ideals and goals of the Association during the past year.
2. Harry S. Ladd, general chairman of the convention, and his general vice-chairman, George V. Cohee, and vice-chairman for S.E.P.M., Richard S. Boardman, and members of the central committee for their over-all planning and managing of plans for the convention.
3. Chairmen and members of the 20 special committees who have served diligently and have contributed to the success of the convention.
4. Francis J. Pettijohn, chairman, and Carle H. Dane, vice-chairman, A.A.P.G. technical program committee, for planning a well balanced and stimulating program of technical papers.
5. A.A.P.G. research committee, for symposium and panel discussion of "Geometry of Sandstone Bodies."
6. Our technical division—the Society of Economic Paleontologists and Mineralogists—for timely and interesting technical programs, including a symposium and panel discussion on Paleontological and Mineralogical Aspects of Polar Wandering and Continental Drift.
7. The Department of Geology at The Johns Hopkins University for publishing the guide books for the field trips, and Olcott Gates, of the Department, for editing the guide-book manuscripts.
8. To the 12 leaders and coordinators of the 4 field trips that preceded the convention.
9. C. E. Wicker of the U. S. Army Engineers for planning and conducting beach-erosion trips during the convention.
10. Our host, the Geological Society of Washington, for its sponsorship of the convention.
11. The individuals responsible for the organization of special programs and all of the authors who prepared and presented technical papers.
12. Lawrence B. Raugh, James E. Knauff, and others at Chalfonte-Haddon Hall, headquarters hotel, for their unremitting assistance to the convention committees in planning and staging the convention.
13. Fred Ehrhardt and others of the Atlantic City Convention Bureau for real assistance, particularly in handling hotel reservations.
14. Leon Somers of the Morton Hotel for providing student housing.
15. Robert C. Stephenson, as editor of *GeoTimes*, for aid in publicizing convention plans.
16. The commercial exhibitors, for their loyal support and attractive display of new exploration tools and services.
17. The educational exhibitors, whose display of new maps, cross sections, and other publications greatly enhanced the professional value of this meeting.
18. Edgar Tobin Aerial Surveys for the Convention Theater, one of the most attractive features of the meeting.
19. The Mayflower Hotel in Washington for reservations and other courtesies in connection with post-convention activities.
20. The Pick and Hammer Club of Washington for devoting its annual Show to the activities of the Association.
21. The 16 companies who generously contributed to the entertainment program of the convention.
22. Electric Log Services, Inc., for publishing the Directory of Hotel Reservations.
23. Rinehart Oil News Company for providing the Convention Registration Board.
24. Petroleum Information Corporation for furnishing Welcome Envelopes to all registrants.
25. Ross-Martin Company for notebooks included in the Welcome Envelopes.
26. The many other companies and organizations who contributed the time and experience of their personnel to convention affairs.
27. The generous contributors to the Association Research Fund.

Be It Further Resolved, that these resolutions be included in the minutes of the meeting and that copies as published in the *Bulletin* be transmitted to those named.

V. T. STRINGFIELD, *chairman*, RAYMOND C. DOUGLASS, WILLIAM J. SANDO

FORTY-FIFTH ANNUAL MEETING, ATLANTIC CITY, APRIL 25–28, 1960

ABSTRACTS

WILLIAM BACK, U. S. Geological Survey, Washington, D. C.

Hydrochemical Facies and Ground-Water Flow Patterns in Northern Atlantic Coastal Plain

Hydrochemical facies is used in this paper to denote the diagnostic chemical aspect of ground-water solutions occurring in hydrologic systems. They reflect the chemical response of the interrelated effects of the lithology and the pattern of ground-water flow. The facies and their distribution are shown on trilinear diagrams, isometric panel diagrams, and maps showing isopleths of chemical constituents within certain formations. The occurrence of the various facies within one formation or group of formations in which the mineralogy is uniform indicates that the flow of characteristics of the aquifer systems controls the distribution of the hydrochemical facies. By use of available head data, flow patterns of the fresh ground water are shown on maps and cross sections. These patterns are controlled in part by the distribution of higher landmasses and the depth to bedrock or to the salt-water interface. Mapping of the hydrochemical facies shows that at shallow depths (less than about 200 feet) the calcium-magnesium cation facies generally predominates in the northern Atlantic Coastal Plain. The bicarbonate anion facies occurs more widely in the shallow deposits of the Coastal Plain than does the sulphate or chloride

facies. In the deeper deposits the sodium chloride facies predominates. The lower total dissolved solids in the ground water in New Jersey indicates that less upward vertical leakage occurs there than in Maryland and Virginia where the shallow deposits contain more concentrated solutions.

BRUCE L. BAKER and GORDON W. HODGSON, Research Council of Alberta, Edmonton, Alberta, Canada

Geochemical Significance of Nickel Complex of Pheophytin

Prophyrin complexes of nickel and other trace metals in petroleum are probably formed from chlorophyll which makes up a minor part of the organic matter from which petroleum develops. Since the chemical and physical environments for the formation of porphyrin complexes must be identical with those for the formation of crude oil, a knowledge of the conditions requisite for the formation of porphyrin complexes is important in defining the conditions under which the associated petroleum is formed. The present study was an investigation of one possible reaction in a likely sequence of reactions leading to the formation of petroleum porphyrins: the complexing of the immediate degradation product of chlorophyll, pheophytin, with nickel. Laboratory experiments were carried out to establish the rate and mechanism of the complexing reaction in the temperature range from 75 to 115°C. in methanol using nickel acetate and pheophytin *a*. It was clear that the reaction mechanism is ionic with the rate depending on the concentration of both nickel ions and pheophytin. The rate of reaction found for the complexing process is sufficiently rapid to indicate a ready formation of the nickel complex of pheophytin in recent sediments, given a reasonable supply of nickel in solution. It was apparent however that the complex is destroyed at sediment temperatures and this precludes the preservation of all but traces of it in recent sediments. It is concluded that the direct reaction between nickel and pheophytin probably does not play a significant part in the formation of nickel porphyrin complexes in petroleum.

DONALD R. BAKER and WILLIAM S. FERGUSON, Ohio Oil Company, Littleton, Colorado

Organic Geochemistry of Cherokee Group in Southeastern Kansas and Northeastern Oklahoma

In southeastern Kansas and northeastern Oklahoma, geological evidence indicates that rocks of the Cherokee group (Desmoinesian) were the source of most of the petroleum which has accumulated in sandstone members and in porous zones along the pre-Pennsylvanian unconformity upon which the Cherokee group was deposited. The Cherokee group in the subsurface is divisible into several cyclothems characterized by nonmarine and marine facies including coal, underclay, sandstone, greenish gray shale, gray (fossiliferous) shale, black shale, and limestone. Although lateral continuity of specific members and cyclothems is evident, the proportion of marine facies is greater in the Cherokee basin than in the adjacent shelf areas.

Organic geochemical studies of the Cherokee group included determination of organic C, hydrocarbons, and saturate-aromatic ratios of the hydrocarbon mixtures. Organic composition, like lithology, shows extreme vertical variability, although principal lithologies have characteristic organic compositions. Greenish gray shales are low in organic C ($<0.5\%$) and hydrocarbons (<50 ppm) with high saturate-aromatic ratios (>1.0); gray shales have intermediate values of organic C (1–3%) and hydrocarbons (100–500 ppm) with low saturate-aromatic ratios (1.0); black shales are high in organic C (5–18%) and hydrocarbons ($<2{,}000$ ppm). Despite this internal variability, the organic composition of the Cherokee group as a whole appears to remain uniform over a wide area.

Implications of these results are: (1) organic composition is an inherent property of sedimentary rocks and reflects depositional environment; (2) migration of fluids through shales during compaction has apparently not created compositional gradients or smoothed out primary differences in organic composition; (3) although the uniform character of Cherokee basin crude oils is explicable if the Cherokee group is their common source rock, lack of knowledge on the origin and migration of hydrocarbons poses problems with respect to details of source evaluation.

R. F. BAUER and A. J. FIELD, Global Marine Exploration Company, Los Angeles, California

Drilling from Floating Vessels in Open Sea

Prior to 1956 offshore wildcat drilling was conducted from fixed platforms or mobile platforms, all of which took their support from the sea floor. Since that time the necessity to work in water depths of 100 feet or more, and the need for cheaper offshore drilling methods in order to make offshore oil competitive in today's market, has led to the development of heavy floating drilling equipment. Up to this time, this type of equipment has been operated in up to 360 feet of water in the open sea. Some of the special features of design of this type of equipment will be shown by slides.

Recently, an engineering study has been completed on the adaption of this type of equipment for very deep water (12,000–15,000 feet) operation. Some of the design problems which have been developed are reviewed.

MAURO D. BELTRANDI, Gulf Oil Company of Libya, Tripoli, Libya
PIERRE F. BUROLLET, Compagnie des Petroles Total (Libye), Tripoli, Libya

Geological Outline of Libya

Cambrian and Ordovician sandstones and quartzites cover the major part of Libya. During Silurian (Gothlandian) time a generally north-south trend from Tibesti through Gargaf to Garian divided the country in two sedimentary provinces, commonly differentiated as "Western-Libya" and "Eastern-Libya."

Western Libya.—Divided by a west-southwest—east-northeast ridge in two distinct sedimentary and structural basins which are known to some of the authorities as the "Gadames" and the "Mourzouk" basins. Marine sediments were deposited in both basins during entire Paleozoic time.

At the end of Carboniferous the Hercynic orogeny was very active in the northwestern part of the Gadames basin, where Upper Carboniferous and Permian sediments produced successive transgressions and unconformities. From Upper Carboniferous to Lower Cretaceous gentle subsidence movements governed the deposition in both of the western basins and produced gradation from shallow marine, to lagoonal and to continental deposits.

Eastern Libya.—The deposition in the eastern portion of Libya was probably active for the greater part of Paleozoic time. Early Paleozoic sediments are preserved in several areas and also in the Kufra basin, to the south. From Permian to Jurassic time this part