

A.E.C., is program chairman; ADDISON YOUNG, Phillips Petroleum Company, is editor, and L. E. GNAGY, 1400 Wilco Building, is chairman of the housing committee. Applications for room reservations should be mailed before January 1 to the S.W.F.G.S. Housing Bureau, Chamber of Commerce, Midland, Texas.

Convention headquarters hotel is the Scharbauer and registration headquarters is across the street in the Midland Mart Building. The technical program will be presented at the Yucca Theater.

M. RAY THOMASSON, president of the Southwestern Federation, will open the sessions with the theme, *The Geology of Fluids*. On the second morning, J. C. SPOULE, president of A.A.P.G., will discuss *Certification and Registration of the A.A.P.G.*

The entertainment committee is arranging plenty of diversion from start to finish.

SPEAKERS AND ABSTRACTS

DRESCHER, WILLIAM J., Engineer, U. S. Geological Survey, Madison, Wisconsin

HYDROLOGIC CONSIDERATIONS IN DEEP-WELL DISPOSAL OF RADIOACTIVE LIQUID WASTES

Disposal of radioactive liquid wastes through deep wells may be categorized as containment or confinement. Containment means the placement of wastes under conditions that preclude their movement out of a definable zone. Confinement means the placement of wastes in a zone where movement may take place under restricted conditions that can be controlled or monitored.

Disposal of liquid wastes on a continuing basis by containment probably is not practical except for small quantities and may be possible in only a few areas. It is probable, therefore, that any deep disposal of radioactive liquid wastes will be by confinement of wastes in certain geologic zones through which they will move at measured rates.

Hydrologic principles applied to the available data indicate that there is circulation of fluids in almost all sediments. Movement of fluids tends to be restricted in the basal parts of sedimentary basins, but any assumption that wastes introduced into a basin would not eventually move out of the basin or to the near-surface formations should be carefully scrutinized. Introduction of wastes into an anomalously low-pressure zone should not be considered safe unless the reason for the low pressure can be explained.

Data necessary to define the hydrodynamics of fluids injected through deep wells will be expensive to obtain, and many of them will have to be collected for each particular disposal site. Geochemical factors may influence greatly the movement of radioactive material in deep formations. A system of monitoring, and possibly removal, is a prime requisite of deep-well disposal of radioactive wastes. Initial disposal activities necessarily will be on an experimental basis pending the results of such monitoring.

ERDMAN, J. GORDON, Senior Fellow, Mellon Institute, Pittsburgh, Pennsylvania

PETROLEUM: ITS ORIGIN IN THE EARTH

The gas-liquid-solid mixture which we know as producible petroleum represents only a small proportion of all fossil organics including coals, oil shales, natural asphalts, etc. In past ages, as today, plant and animal detritus was deposited and preserved in fine-grained sediments in environments ranging from fresh-water swamps to marine slopes and basins. Why do only cer-

tain of these environments favor the genesis of accumulative oil? What are the controlling ecological and chemical factors? By what mechanisms do the constituents of petroleum migrate into the reservoir? To what extent does fractionation occur during migration? Does chemical alteration occur during migration and after accumulation in the reservoir? Today, answers to these questions are being sought in many laboratories throughout the world.

Living organisms do not generate, as part of their life processes, many of the hydrocarbons and other chemical compounds characteristic of petroleum. Further, the components are not in thermodynamic equilibrium under earth conditions and, hence, independent of the structure of the source material. The nature of the source material derived from living organisms and its quantitative variation as a function of environment is being determined through study of Recent sediments. Changes in composition with age and depth of burial are being observed and the mechanisms of the reactions elucidated. Good progress has been made toward recognizing the sources for constituents of petroleum ranging from the hydrocarbon gases to the asphaltic residues. In several instances reactions involved in their genesis have been duplicated.

Fractionation of the organic matter begins with deposition and continues throughout subsequent geologic time. Physical processes are interrelated with the chemical and the two must be considered together.

No satisfactory mechanism has been proposed for the migration of petroleum out of the fine-grained source rocks into the reservoir. Mechanisms involving oil as a separate phase, as a soapy colloid, or as a solution in water, all seem to fail under experimental scrutiny.

GIBSON, GEORGE R., Geological Consultant, Midland, Texas

OCCURRENCE OF OIL AND GAS IN SOUTHWESTERN REGION—GEOLOGIC FRAMEWORK

A structural relationship exists in several areas in the Southwestern region between rock types in the Precambrian and Paleozoic structural trends. The Ouachita geosynclinal belt on the south and east of the Texas Craton which underlies the Southwestern region was the dominant structural feature during the Paleozoic and probably exercised indirect control over all intracratonic structures. Most of the early and middle Paleozoic oil and gas reservoirs are associated with unconformable surfaces. These reservoirs were formed by weathering of the unconformity surface particularly where pre-unconformity folded and faulted structures existed.

Four Paleozoic continent-wide interregional unconformities are present. The approximate dates of the regressive maxima represented are: (1) very late Precambrian, (2) early Middle Ordovician, (3) early Middle Devonian and (4) post-Mississippian. In addition, many regional unconformities are present, the most important in relation to the source, migration, and accumulation of oil and gas being that between the Permian and Pennsylvanian. This regional unconformity is composed of local unconformities associated with structurally positive areas. Early and middle Paleozoic hydrocarbon source beds were probably organic-rich sediments overlying the unconformities. Late Paleozoic Pennsylvanian and Permian sediments were by far the most abundant source of hydrocarbons in the reservoirs in the middle and early Paleozoic formations. Within the Pennsylvanian and the Permian, unconformities are important; however, their importance is overshadowed by lithofacies phenomena in the form of reefs which