MEETINGS

HGS LUNCHEON MEETING– OCTOBER 25, 1989

W. J. EBANKS, JR.—Biographical Sketch

W. J. Ebanks, Jr. received his Bachelor of Arts, Master of Science and Doctoral degrees from Rice University in Houston, Texas in 1958, 1965, and 1967 respectively.

Dr. Ebanks has a long and distinguished career in the oil industry in the Gulf Coast and Midwest. He has worked for Kerr-McGee, Exxon Production Research Company, Union Carbide Petroleum Corporation, Ashland Exploration Company, and Cities Service Company. From 1972 to 1981, Dr. Ebanks was the Chief of the Subsurface Geology Section of the Kansas Geological Survey.

From 1983 to the present, Dr. Ebanks has been Director of the Reservoir Geology Group of ARCO Oil and Gas Company, Plano, Texas.

Dr. Ebanks is the author of numerous articles on sedimentology, petroleum geology, reservoir geology, and resource assessment. He received the 1975 A. I. Levorsen Memorial Award for Best Paper, Mid-Continent Section, AAPG, 6th Biennial Meeting, and he is the AAPG Foundation's Haas-Pratt Distinguished Lecturer.

DEVELOPMENT GEOLOGY - ADVANCES IN THE EIGHTIES, PROSPECTS FOR THE NINETIES

Development geology is crucial to maximize the ultimate economic recovery and value of hydrocarbon resources. Important economic decisions about a field can best be made if reservoir engineering models used to forecast production behavior are designed with a thorough understanding of the field's physical properties. Accurate, detailed description of a field is the key to successful reservoir management from discovery to abandonment, and important advances have been made recently in formulating and using these descriptions.

All reservoirs are heterogeneous. Geological complexity can have a profound influence on the paths fluids take in interwell volumes. Increasing experience with enhanced oil recovery projects and infill drilling programs has emphasized the importance of antisotropic permeability and of barriers to fluid flow as major causes of incomplete recovery of hydrocarbons. Good progress has been made in understanding the geologic causes of reservoir heterogeneity, but progress in expressing these insights quantitatively has been slow. Greater computing power and innovative graphic displays enable petroleum engineers to use more geologic detail in models of reservoir behavior. This ability to use more detail has increased the demand for quantitative expression of geologic information. To meet this demand, stochastic modeling techniques are being applied to estimate spatial variability of reservoir quality and evaluate uncertainty in development drilling.

Detailed description of reservoirs has increased awareness of the need for more deterministic information about them. Geophysical techniques, especially improved surface three-dimensional and crosswell reflection surveys, are being used more frequently. Engineering methods, including pressure transient analyses and tracer injection surveys, are being applied to the estimation of effective, large-scale properties of reservoirs. Geological understanding is essential to correctly interpret both geophysics and engineering measurements. Similarly, historical production data can be used to refine geologic interpretations in some cases.

Research on the microscopic controls on distribution and flow of fluids in reservoirs has led to a better understanding of absolute and relative permeability and of capillarity. As a result, pore geometry that focuses on that geometry's effects on fluids rather than on the geometry's origin has gained renewed acceptance. This concept is especially useful in communicating information from the petrographer to the petrophysicist and the engineer. This has led to more representative sampling of reservoir rocks for petrophysical measurements and fluid flow experiments, and, consequently, better estimates of ultimate productivity.

During the 1990's, the prospects are good for further improving the accuracy and usefulness of reservoir descriptions. The demand for greater quantitification will lead to more detailed studies of outcrops, with emphasis on variations in petrophysical properties and bedding geometry. Armed with these new insights, geologists will be able to design conditioned stochastic models, which will increasingly be used to make equiprobable estimates of the distribution of reservoir properties in the subsurface. Geophysical methods for detecting reservoir lithology and variations in porosity will continue to improve, as will the capability to monitor the subsurface movement of fluids. Further integration of well-log analysis with petrographic and petrophysical information will enhance the recognition of lithological variations in reservoirs, especially by application of formation microscanning and geochemical logging techniques.

As the emphasis in industry shifts from exploration to development, one of the most important changes will be much greater integration of geology and engineering at a working level. Multidisciplinary teams of professionals working on reservoir-management problems will overcome traditional barriers to communication, resolve conflicting priorities, and develop a more holistic view of the reservoir than has commonly been done. This trend, which has already begun, will require broader training, better mutual understanding, and sharing of information and ideas among team members. Geologists will continue to play an important role in reservoir analysis, and challenging opportunities for this type of work will increase.