HGS LUNCHEON MEETING— MAY 27, 1992

Social Period, 11:30 a.m. - 12:00 p.m.,
Luncheon and Meeting, 12:00 p.m.
The Houston Club

ROBERT J. WEIMER—Biographical Sketch

Robert J. Weimer, geologist, educator, energy consultant, and civic leader, attended the University of Wyoming, receiving a B.A. in Geology in 1948 and a M.A. in 1949. He received his Ph.D. from Stanford University in 1953.

From 1949 to 1954 he was a geologist with Union Oil Company of California working in the Rocky Mountains and Permian Basin. In 1954 he turned his attention to U.S. and foreign petroleum exploration as a consulting geologist, work which he continues today. He joined the faculty at Colorado School of Mines in 1957 and taught until retirement as Getty Professor of Geology in 1983.

Dr. Weimer has been a visiting professor at the University of Colorado (1961), University of Calgary (1970), and the Institute of Technology at Bandung, Indonesia (1975). He has been a distinguished lecturer in the Fulbright program at the University of Adelaide (Australia), and for the American Association of Petroleum Geologists and the Society of Exploration Geophysicists. In addition to serving on many national committees, he has published numerous notes, articles, and books. He has also served as officer, and in other capacities, for scientific and professional societies.

Bob Weimer has received many honors and awards, including the Distinguished Alumnus Award from the University of Wyoming, Scientist of the Year from the RMAG (1982), Brown Medal from CSM (1990), the Parker Medal from the American Institute of Professional Geologists (1986), and the Sidney Powers Medal from the AAPG (1984). He is currently President of AAPG.

SEQUENCE STRATIGRAPHY: CHALLENGES AND PROBLEMS IN FUTURE EXPLORATION AND PRODUCTION

Sequence stratigraphy is the study of genetically related strata—depositional sequences—which are bounded by unconformities or their correlative conformities. An unconformity is defined as a sedimentary structure of regional occurrence in which two groups of rocks are separated by an erosional surface; the erosion may be by subaerial or submarine processes.

A sequence stratigraphic analysis of an oil-producing basin has several components. First and foremost is establishment of a geologic model in which facies distribution and thickness in regressive-transgressive cycles are reconstructed by use of subsurface well data, paleontologic data, seismic, and outcrop sections where available. Emphasis is placed on location of the shoreline facies for each time-stratigraphic interval. Second, key surfaces related to unconformities or condensed sections are traced regionally. Third, the distribution of the coarsest-grained detrital sediment (e.g., conglomerates) is analyzed in relation to unconformities. Fourth, condensed sections, generally with high total organic content (source rocks), are mapped and related to the above features. Burial history of the basin is then related to oil generation and migration to traps.

The tracing of key surfaces in the shoreline and shelf (neritic) setting is essential. Two types of major erosional surfaces are observed within or at contacts of sandstone units. Each is associated with major changes of sea level, but the magnitude of erosion may be influenced locally by tectonic events. One type, a sequence boundary, is called a lowstand surface of erosion (LSE) related to a lowering of base level which causes a subaerial exposure and incisement of drainages into older deposits. The second type is a transgressive surface of erosion (TSE, also called a ravinement surface) related to shoreline and shoreface (marine) erosion, that is related to a rising sea level and water deepening. The unconformity associated with the TSE occurs within a depositional sequence. These two surfaces may merge in the offshore marine or interfluve areas between paleodrainages.

A third type surface can sometimes be identified that is related to nondeposition with possible minor erosion. If present, it occurs within a marine condensed section that

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generally has a high total organic content. Minor scour may concentrate lags of shells, or glauconite and phosphate grains. Bentonite may occur in shale layers above or below the surface. In sequence stratigraphy such a surface has been called: the surface of maximum transgression, maximum flooding surface, or, maximum starvation surface.

Minor erosional surfaces associated with depositional processes within environments of deposition are called diastems (e.g. scour at the base of a channel). Diastems are not to be confused with the major erosional surfaces.

Tracing the key surfaces from shallow water into deeper marine environments of the slope and basin and across growth faults sets the stage for predicting sand distribution and offers a predictive model for improved success in future exploration and production programs.

New stratigraphic terminology has been introduced to subdivide and analyze depositional sequences. These new terms have been classified as chronostratigraphic, and offered as replacements for lithostratigraphic or allostratigraphic terms as defined by the North American Commission of Stratigraphic Nomenclature (e.g. parasequence for formation, member or bed). Geologists now face the challenge of integrating the new terminology with the formalized standard terms, or of ignoring most of the new terms as unnecessary, or of adopting the new terms and discarding the old.

Examples of sequence stratigraphic analyses or analyzing petroleum occurrences are discussed in different tectonic settings.

Searching for an unconformity (sequence boundary), lower Cretaceous Lytle Formation, South Central, Colo.

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