INTERNATIONAL EXPLORATIONISTS

HGS INTERNATIONAL EXPLORATIONISTS DINNER MEETING—MARCH 6, 1991

TIMOTHY R. McHARGUE—Biographical Sketch

Timothy R. McHargue has been a division geologist in the Exploration, West Africa group of Chevron Overseas Petroleum Inc. since 1989. Timothy graduated from the University of Missouri with a B.S. in geology in 1971, and received his M.A. in geology in 1974 at the same school. He was granted a Ph.D. in geology at the University of Iowa in 1981. McHargue was awarded the Maurice G. Mehl Award in 1972 and the Ernest B. Palmer Award at the University of Missouri.

His professional experience is diverse and started with a field assistantship at the U.S. Geological Survey in Denver during the summer of 1971. McHargue was a graduate teaching assistant at the University of Missouri from 1971 to 1974. He joined Phillips Petroleum in 1974 working on exploration projects in the Powder River, Sacramento and Permian Basins, Alaska Peninsula, Chile, northwest Africa, Oman, Pakistan, and the People's Republic of China. During 1978-81, McHargue worked as a graduate teaching and research assistant at the University of Iowa. He joined Exxon Production Research Company as a summer intern in 1980.

Timothy McHargue started with Chevron Oil Field Research Company as a senior research geologist in 1981. His responsibilities included reservoir evaluation of carbonate and clastic units, and environments of deposition and diagenesis of cored intervals. Timothy joined Chevron Overseas Petroleum Inc. as a staff geologist in 1984. He was later promoted to senior geologist working on exploration, basin evaluation, and regional geology of Africa studies.

During 1982-1983, McHargue worked as a part-time instructor at California State University at Long Beach. At present, he is working temporarily as a research associate with Peter Vail at Rice University.

McHargue is a member of GSA, AAPG, SEPM and Northern California Geological Society. He has published numerous articles in different geologic journals.

STRATIGRAPHIC DEVELOPMENT OF PROTO-SOUTH ATLANTIC RIFTING IN CABINDA, ANGOLA

Cabinda is a small, detached enclave of Angola that produces most of that country's oil. An understanding of this important oil province requires an understanding of its Lower Cretaceous syn-rift stratigraphy. The rift sequence of West Africa contains basinal lake shales that are the source rocks for most of the produced oil, not only in Angola, but in Gabon, Congo, and Zaire as well.

Rift sediments can be subdivided into tectonostratigraphic packages that correspond to the structural history of the rift. The FAULT PHASE (NEOCOMIAN) is characterized by rapid subsidence adjacent to major faults early in the development of the rift so that the rift is structurally subdivided into sub-basins. Each sub-basin developed a stratified lake and had a similar subsidence history although the stratigraphy of each sub-basin varied depending on the influx rate of detrital sediment. Rapid transitions from alluvial, lake-margin sands to lacustrine shales are typical of this phase. In lacustrine units, diamictites, turbidites, and contorted bedding are common.

In the EARLY SAG PHASE (EARLY BARREMIAN) fault-related subsidence gradually ended and was replaced by regional rift-basin-scale subsidence. Separate lakes expanded, submerged former alluvial deposits and coalesced to form a single lake. Synchronous lake level fluctuations can be recognized in all sub-basins in Cabinda. During low-stands, carbonate deposition expanded into basinal settings and organic carbon content decreased. During high-stands, the amount of organic carbon increased and deposition of basinal organic shales expanded across former sites of carbonate deposition. Influx of coarse extrabasinal clastics into the rift virtually stopped.

In the LATE SAG PHASE (LATE BARREMIAN) rates of regional subsidence gradually diminished and faulting became rare. The lake became shallower as it filled with sediment and its water column became fully oxygenated. Rhythmic fluctuations of lake level and chemistry are preserved as laterally persistent cyclical alternations (typically 10 m thick) of carbonate-rich and -poor mudstones. Thick carbonates accumulated in the shallowest parts of the lake.

DRIFT PHASE (APTIAN): Near the beginning of the Aptian, the entire region was uplifted and subjected to erosion. Uplift is attributed to rebound of the rift shoulders after crustal rupture. Following uplift, the pattern of renewed subsidence was that of a passive margin rather than a rift.

Throughout the history of the rift, sedimentation was controlled by the rate of subsidence relative to the influx rate of sediment. Superimposed on the tectonic evolution of the basin were climatic variations which affected lake level and chemistry to produce depositional events essential for correlation.