HGS Dinner Meeting
April 10, 1995
Post Oak Doubletree

Northern Gulf of Mexico: An Integrated Approach to Source, Maturation, and Migration

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Exxon has conducted an integrated, multi-disciplinary study of sources, maturation, and migration pathways in the offshore Gulf of Mexico (GOM). We developed a geological framework from 2-D and 3-D seismic, identified and mapped potential source intervals, and delineated migration pathways to reservoirs and amplitude anomalies. Hydrocarbon compositions from over 2000 oils, 500 gases, and 1000 hydrocarbon-bearing sea bottom drop cores constrain source rock characteristics, such as organic matter type, depositional facies, and, to some extent, age. East of the Mississippi River Delta the complete stratigraphic section is seismically visible and wells have penetrated deep source intervals. To the west, correlative organic-rich rocks have been sampled onshore and from sheaths overlying salt diapirs offshore. Integration of these data with the regional geological framework provides a strong basis for hydrocarbon system interpretations.

Widespread oil and gas seepage in the GOM has allowed extension of hydrocarbon systems and maturity maps far beyond well control. Abundant seepage documents that the GOM slope is an actively migrating hydrocarbon system and provides a means of identifying major migration pathways. Improved understanding of regional hydrocarbon systems has provided new exploration methodologies and play concepts.

Biographical Sketches

Lloyd M. Wenger

Lloyd M. Wenger is a Research Specialist with Exxon Production Research Company, currently on long-term loan assignment to Exxon Exploration Company-Americas Business Unit. Wenger received a B.S. in Geology from Juniata College, an M.S. in Geology and Chemistry from Idaho State University, a Ph.D. in Geochemistry from Rice University, and did Post-Doctoral research at the University of Oklahoma. Since joining Exxon in 1988, he has worked predominantly on the geochemical characterization of oils, gases, seeps, and source rocks in the onshore and offshore Gulf of Mexico and the application of these data to evaluating secondary migration pathways for Exploration.

Ken Hood is a Senior Petroleum Geologist with Exxon Exploration Company, currently assigned to the Gulf of Mexico Source, Maturation, and Migration Study. Ken received a B.S. in Geology from the University of Missouri-Columbia in 1983, an M.S. in Geology from the University of Kansas in 1985, and a Ph.D. in Geology from the University of Kansas in 1989. Since joining Exxon in 1988, Ken has worked on projects in the Gulf of Mexico and in Norway.

Stanley C. Harrison is a Geological Associate with Exxon Exploration Company, currently assigned to the Source, Maturation, and Migration Study. Stan has 14 years experience in the Gulf of Mexico and prior to that, spent 10 years in Uranium Exploration with Exxon Minerals Company. Stan has a B.A. from the University of Montana, M.S. from Texas Tech, and a Ph.D. in Geology from the Johns Hopkins University.

Oliver Gross is a Senior Exploration Geophysicist with Exxon Exploration Company's Americas Business Unit. Oliver received a B.S. in Geology from Illinois University in 1977, and an M.S. in Geology from the University of Wisconsin. During 15 years with Exxon, Oliver has worked projects ranging from the Norphlet at Mobile Bay, Triassic rift plays, East Texas Louark, Tuscaloosa Trend, Cretaceous carbonate play, and U.S. Gulf Coast Tertiary (both onshore and offshore) in Production and Exploration.

Lynne Goodoff had 17 years experience with Exxon in both Production and Exploration. She is currently employed with Pennzoil Exploration and Production Company in Houston.