

EVENING MEETING—MARCH 10, 1980

MORAD MALEK-ASLANI—Biographical Sketch



Morad Malek-Aslani was born in 1924 in Tabriz, Iran. He attended high school and college in Tehran. He received a B.S. degree in mining engineering from the University of Tehran. In 1947, he came to the U.S. and attended the Colorado School of Mines where he received an M.S. (1950) and Ph.D. (1952) in geology.

From 1952 to 1958 he was employed as an exploration geologist with the Texas Gulf Sulphur Com-

pany. In 1958 he joined Tenneco Oil Company as a senior geologist. Currently, he is a staff geologist with the Geological Research Department of Tenneco Oil Company in Houston. During the past twenty years, M. Malek-Aslani has been engaged in applied research and exploration projects in carbonate evaporite basins around the world. He has authored several papers and has addressed various geological societies on carbonate subjects.

ENVIRONMENTAL AND DIAGENETIC CONTROLS OF CARBONATE AND EVAPORITE SOURCE ROCKS (Abstract)

The organic geochemistry of the shale source rocks has been a subject for extensive research during the past two decades. Many useful interpretive techniques have been developed for the assessment of hydrocarbon potential of sedimentary basins in which shales are the principal and logical source for petroleum generation. Nevertheless, the present understanding of carbonate and evaporite source rocks remains superficial. The criteria generally employed to assess shale source rocks are inadequate and misleading when applied to carbonate-evaporite basins.

Most misconceptions regarding the hydrocarbon potential of carbonate and evaporite rocks stems from a simplistic notion that organic matter associated with the sediments on well-aerated carbonate shelves and evaporite depositing environments is not likely to be preserved. Recent data on organic geochemistry of Holocene carbonates from shallow shelves suggest that:

- a. organic matter can be preserved in certain environments.
- b. the kerogens produced from degradation of organic matter in carbonate sediments are predominantly sapropelic and therefore much more efficient sources for hydrocarbons than the mixed humic-sapropelic kerogens of shales.

The preservation of organic matter in carbonates and evaporites is controlled primarily by environments of deposition and the diagenetic overprints. Sabkha, lagoonal and basinal environments, for example, are excellent for organic matter preservation. Vadose and fresh-water phreatic diagenetic environments are *not* favorable for organic preservation. The marine phreatic diagenetic environment, however, is favorable for preservation of organic matter.

The transgressive-regressive couplets, which are made up of numerous upward-shoaling cycles, provide for generation and accumulation of hydrocarbons. The transgressive cycles are generally favorable to preservation of organic matter; whereas, the regressive cycles are favorable sites for development of porosity. Where the transgressive-regressive couplets are buried at a sufficient depth, to bring about the thermal degradation of organic matter to petroleum, major accumulation of hydrocarbons occur.

The synchronous and post-sedimentary tectonic events also seem to have a positive influence on the source-rock potential of carbonates and evaporites. Rapidly subsiding shelves would place the organic-bearing carbonates below the destructive influence of the fresh-water phreatic zones. Late structural movements could produce the micro-fracture systems which would form the avenues for petroleum migration from source to reservoir rocks.

Geochemical data on ancient rocks strongly suggests that sabkha evaporites should be seriously considered as a possible source rock for petroleum.