INTERNATIONAL EXPLORATIONISTS DINNER MEETING—MARCH 15, 1989

WILLIAM F. BISHOP—Biographical Sketch

William F. Bishop is a consulting geologist, specializing in international projects. He received an A.B. degree in 1954, and a M.A. in 1957, both in geology from Miami University (Oxford, Ohio). Mr. Bishop worked with the U.S. Army Corps of Engineers in the U.S. and Germany for two years during his graduate studies.

Bishop's career began with Marathon Oil Company in Shreveport, La. He moved to Tenneco in 1963 and spent several years with their international group in evaluation of various basins in Africa and the Middle East. In 1972, he joined Weaver Oil and Gas, and in 1973, he joined Ashland Oil as international exploration advisor, where he was responsible for exploration in the Far East and Latin America. Bishop joined Tenneco once again in 1977. He conducted geological investigations in Africa and the Middle East as regional exploration coordinator. During part of 1986-87, he was the sole subcontractor and coauthor of a multi-client study by the Robertson Group Petroleum Division (formerly Robertson Research International) working on the petroleum geology and hydrocarbon potential of Iraq.

Bill Bishop has authored numerous articles on such diverse topics as the Smackover Formation and Jurassic contemporaneous faulting in North Louisiana/South Arkansas; petroleum geology of Tunisia, northern Central America and offshore Kalimantan in Indonesia. He was president of the Houston Geological Society in 1981-82, and also held positions with the Field Trip Committee of the HGS. With Carolyn Ross, he co-founded the International Explorationists Group of the HGS and served as its moderator for two years.

Today's talk is excerpted from his work for the Robertson Group Petroleum Division whose permission is acknowledged.

PETROLEUM GEOLOGY OF IRAQ

Iraq is one of the few places in the world where structurally controlled, giant oil fields still can be found with conventional seismic and probably even with surface mapping. Because of a seven-year hiatus following nationalization of nonproducing areas, limited exploration from 1968-80, and disruptions caused by the war with Iran, Iraq has not been as intensively prospected as other countries in the Middle East region.

Tectonically, most of southern and western Iraq is included in the Arabian platform which is rimmed on the northeast by an "unfolded" foreland. The autochthonous foreland fold belt comprises of anticlines of the Zagros foothills and extends from the Iranian border northwestward to the vicinity of Mosul where it turns sharply westward into Syria. Northeasternmost Iraq includes a narrow, parautochthonous thrust belt bounded by the main Zagros thrust, northeast of which is an allocthonous nappe complex.

Fields of the Zagros fold belt produce primarily from Cretaceous and Eocene-Miocene carbonates. Many anticlines are untested or inadequately tested. As in Iran, disharmonic structuring occurs because of the thick Miocene evaporite section. Potential Cretaceous and older reservoirs are underexplored.

The southern Iraqi fields are on the Arabian platform, where the principal reservoirs are mostly middle Cretaceous sandstones and some carbonates. The giant Zubair and Rumaila fields almost certainly are salt-accentuated, but this very likely is controlled by vertical basement fault trends, which may extend for hundreds of kilometers. The recently discovered East Baghdad field is far to the northwest of the older fields. Earliest Cretaceous and older rocks are virtually untested.

Potential and proven source rocks, ranging in age from Carboniferous to Tertiary, have been identified in the subsurface succession of Iraq. Considerable thicknesses of good quality, oil-prone source rocks exist in several intervals, the most important being basinal strata of Jurassic-Early Cretaceous age. Iraqi oils are derived mainly from these mature sources, and from underlying source rocks and laterally from downdip "kitchens."

Oil is found mostly in carbonate rocks but Lower Cretaceous paralic sandstones are the principal reservoirs in southern Iraq. Carbonate reservoirs are of three general types: (1) reefal and associated facies, including backreef-lagoonal, which generally are highly fractured and locally dolomitized; (2) shoal pack/grainstones, high-energy facies which may include reefal material and commonly are intensely dolomitized and locally fractured; (3) open-marine limestones composed mainly of indurated, dense, marly lime mudstone, which are reservoirs only because of late fracturing.

A Carboniferous shale is widely distributed and should be an effective seal in addition to its potential as a source rock. The most important regional seal in the Mesozoic is the evaporite section of latest Jurassic age. Its absence in most of northern Iraq explains the efficacy of vertical migration from presumed Jurassic sources in the northern oil fields. Its role in preventing this phenomenon in the southern fields is also recognized. The only other seal of regional significance is the evaporite section of the middle Miocene, which extends northwestward in a broad belt through central Iraq from Kuwait to Syria.

The combination of widespread and mature source rocks with exceptionally thick reservoirs and adequate seals on very large structures accounts for the tremendous proven hydrocarbon accumulations of Iraq, and ensures the equally great potential for future exploration.