

Abstract

OIL OCCURRENCES IN THE MIDDLE EAST

P. F. Brennan

The accepted area of the Middle East currently includes Iran, Iraq, Sa'udi Arabia, Kuwait, Bahrein, Qatar, the Trucial Coast sheikdoms, Jordan, Syria, Palestine, Turkey and Egypt. Of these, the last five are disregarded for present purposes.

Geologically, the remaining area, vast as it is, may be broadly subdivided into three component parts. These comprise (1) the Arabo-Nubian massif in the southwest, (2) the Iranian mountain area to the north and east, and (3) a broad "foothill zone" between these two.

The massif is a lofty, dissected, mountain-rimmed plateau of crystalline rocks, occupying much of Arabia and extending up to and beyond the Red Sea rift. To the north and east, a very thick series of varied sediments, covering much of geologic time, abuts against the craton and dips regionally northeast towards the Iranian mountain front. These sediments occupy the so-called foothill zone. The mountain front itself follows a sinuous course across Iran, from Turkey to the Persian Gulf, and represents an area of geo-synclinal deposition, uplifted by orogeny during Tertiary time.

Three types of oil-reservoir, each presenting distinctive lithologic and structural characteristics, are developed in the area. They comprise (1) the Limestone reservoirs of Iran-Iraq, (2) the Sand and Sandstone reservoirs of south Iraq-Kuwait-Arabia, and (3) the Limestone reservoirs of Sa'udi Arabia and the Qatar peninsular.

The limestone reservoirs of the Iran-Iraq foothills occur as anticlinal folds developed in a thick, dense limestone sequence - the Asmari - of Eocene to Miocene age. These anticlines are typically of great size, length, and closure, the depths to the producing horizon varying greatly from field to field. Folding is severe, with the southern limb in many places approaching the vertical, and tectonic fissuring, which controls the flow of oil in the otherwise dense rock, is abundant but not always of uniform distribution. Oil and gas columns are generally large, and well-potentials in excess of 20,000 bd. are not uncommon.

To the south and west, this Tertiary limestone sequence is replaced by uncapped clastics, and fields of this age are absent. The sand reservoirs of southern Iraq and Kuwait are developed as broad, gentle anticlinal and domal folds in thick quartz-sand bodies of Lower Cretaceous age forming clastic fans around the massif to the southwest. Folding is very slight, but great areal extent together with very thick pay-zones combine to produce large reservoirs. High porosities and permeabilities are typical, and well-potentials of up to 10,000 bd. are common.

The limestone reservoirs of Sa'udi Arabia and Qatar occur as broad anticlinal folds in oolitic limestones developed in an otherwise evaporitic sequence, the so-called Arab Zone, of Upper Jurassic age. Folding is generally mild, but, again, the individual structures are typically of great areal extent and net pay thickness, and, with high porosities and permeabilities prevailing, individual well potentials are generally high.

Oil has been known and used in the Middle East since the dawn of human history in the area: only recently, however, has its exploitation begun to change the pattern of existence of entire peoples. Strategically and economically, the area is coming into its own; it is, even in the blase world of oil, something of a phenomenon.
