

Fate of the Cretaceous Rudist Buildups in the Arabian Basin and its Impact on Their Reservoir Characteristics

Fadhil Sadooni¹

¹Qatar University, Doha, Qatar

Abstract

The Cretaceous rudist buildups are important hydrocarbon reservoirs in many parts of the Arabian Basin. They are distributed geographically as from northern Iraq down to Oman. Rudist-bearing or rudist-generated limestones host a significant proportion of the hydrocarbon reserve of the Arabian Basin. These include the Shu'iba Formation in the southern parts of the basin and the Mishrif Formation in its northern extensions. Other important reservoirs include the Natih Formation in Oman, the Maaddud Formation all over the basin, and the Hartha Formation in central and west Iraq and the Simsima Formation in Abu Dhabi. Rudist buildups are not as homogenous and solid as coral reefs. They are not always wave-resistant and in many cases, depending on the life-mode of the prevalent species, may form just low banks that can be shifted by water. They are not encased in hard skeleton like corals and hence they are more prone to water action and incapable of restricting water circulation and so there is no clear shelf differentiation among their sediments. The demise of the rudist buildups were achieved either by a sudden drowning as it is the case with the Hartha Formation that was covered with the basinal globigerinal marly limestone of the Shiranish Formation in central Iraq; destruction by waves as it is the case with the Shu'iba Formation in Abu Dhabi fields; emergence as it is the case with the Mishrif Formation in southern Iraq or by clastic invasion as it is the case with the advancement of a clastic front of the Nahr Umr Formation over the Shu'iba Formation in Kuwait. These demise mechanisms are found to generate varied rocks with different reservoir properties. Drowned buildups tend to be well preserved, compact and have more argillaceous materials. The destructed buildups generate wide-scale bioclastic grainstone and packstone bodies of high porosity and permeability values. Those covered with clastic sediments are subjected to meteoric water and tend to be well cemented. The rudist buildups in such cases are covered with fresh water lacustrine sediments and show many subaerial diagenetic features. Poroperm and capillary pressure data sets collected from different rudist-bearing reservoirs across the Arabian Basin reflect such differentiation. Recognizing these processes may help predicting locations of the best-developed rudist-bearing reservoirs.