

# EXPLORATION FOR PETROLEUM IN CARBONATE ROCKS

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## ABSTRACT

Forty per cent of the world's proven petroleum reserves have been found in carbonate rocks and, with the present emphasis on exploration for the stratigraphic traps, it is likely that the tempo of search for petroleum in carbonates will intensify in years to come.

The present methods of exploration, which have evolved from years of experience in search of structural accumulations, are inadequate for finding the stratigraphic traps and, particularly, the stratigraphic traps in carbonate rocks. The recently discovered giant Fairway field in East Texas, which produces oil from Lower Cretaceous James reef, is a good example of hidden future reserves yet to be found in carbonate rocks. Although telltale signs of proximity to a stratigraphic trap were present in the wells drilled adjacent to the Fairway field, it remained undiscovered for many years in the middle of a densely drilled area of East Texas. This case history clearly points to the inadequacy of a strictly structural approach to oil-finding in carbonate rocks. The conclusion is unavoidable that the environment of carbonate rocks plays an important role in generating and trapping hydrocarbons; therefore, a logical exploratory technique should be based upon reconstruction of paleogeography. The application of petrography to the interpretation of the carbonate environment is showing a great promise and should be considered as an integral part of exploration.

The author recommends a three-phase program of exploration in carbonate rocks. Phase I encompasses the conventional subsurface methods, a familiar technique to petroleum geologists, the object of which is to recognize various carbonate cycles, to establish correlation, and to map anomalies within each cycle. The knowledge of the subsurface geology is an essential prerequisite to the subsequent phases. Phase II of the program deals with the applications of the carbonate petrology to the detailed interpretation of the paleogeography of the stratigraphic unit within which commercial accumulation of hydrocarbon is proven or suspected. The known accumulations of hydrocarbon within the stratigraphic unit is related to the paleogeography, and the nature and geometry of the entrapping mechanism is studied. Phase III of this program is devoted to the application of knowledge gained to the exploration, development and accurate estimation of reserves. The understanding of the geometry and the anatomy of the carbonate trap could be a great aid in the planning of a secondary recovery program.

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