Favorable Oil- and Gas-Bearing Facies of the Carboniferous and Permian Systems in South China

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Abstract

This report deals with the Carboniferous and Permian Systems in South China. Of basic importance to an understanding of these strata is an outline of the sedimentation involved and a comprehensive division of the sedimentary facies present. Accordingly, we must recognize such qualifying features as the paleogeography, the average high-tide level, sea level and wave-base level during each portion of the geologic time under discussion. We suggest that the sedimentary rocks of the Carboniferous and Permian Systems can be divided into 3 major facies and 13 minor facies. The major facies are divided into those that accumulated in a regime, those that were deposited near the shoreline, and those that formed in a carbonate platform environment. The continental rocks include volcanic facies, eluvial facies, and fluvial-plain facies. Those deposited near the shoreline include shore-plain facies, shoreside tidal-flat facies, shoreside-shoal facies, and shoreside-basin facies. Strata formed in a carbonate-platform environment include platform basin-swamp facies, platform-flat facies, platform-depression facies, platform-bank facies, platform-reef facies, and platform-basin facies.

In order to assess how these facies relate to favorable zones for oil and gas development, we must consider the following three aspects: Some sedimentary facies are favorable for oil and gas generation; other facies are favorable for the accumulation of hydrocarbons; and other facies are favorable as oil and gas reservoir rocks. Finally, prospective regions for oil and gas production must be analyzed according to the distribution of favorable facies for oil and gas generation, accumulation and entrapment in combination with conditions of regional conservation.

Introduction

This paper describes the results of only one phase of a monographic study on the subject “Sedimentary Facies and Prospects for Oil and Gas from the Carboniferous and Permian Systems in South China”. This approach toward determining the favorable oil- and gas-bearing facies has been a major effort in recent years. Particular emphasis has been placed on the division of sedimentary facies and recognition of their use in oil and gas exploration. We hope this paper will attract purposeful attention and create rewarding discussion in order to serve better the assessment of oil and gas resources in areas underlain by upper Paleozoic strata.

Division of Sedimentary Facies

Sedimentary Environment During Carboniferous and Permian Time

The Carboniferous and Permian strata that were extensively developed and widely distributed in South China are a very important sequence for finding oil and gas in marine carbonate rocks in our country.

The lower Carboniferous comprises a series of marine carbonate and nearshore to continental transitional strata containing coal-bearing clastic rocks. The thickness of this sequence varies considerably, from a