Types of Microbialites and its Reservoir Rock Characteristics of the Mesoproterozoic Wumishan Formation in Jixian County, Tianjin, China

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The North China area is characterized by rifting and rift trenches developed during the Proterozoic, including the Yanliao rift trench, which started forming at 1.8Ga, and the Wumishan Formation, which was deposited during the middle Mesoproterozoic (Cui et al., 2000; Wang et al., 1995). The rift trough was formed last. Jixian County in Tianjin is located in the center of a strong depression of geological background with a total sedimentary thickness of 10,000m. The Wumishan Formation has a sedimentary thickness varying from 1,030m to 5,400m in the North China area. Jixian County lies in the center of strong depression of the Yanliao rift trench, strong depression of geological background, with sedimentary thickness reaching 3,300m, and belong to carbonates tidal flat deposit.

Through macroscopic description of microbialites of the Wumishan Formation from the lower, middle, and upper typical profiles include M2, M6, M8, and M11 as the second, sixth, eighth, and eleventh members of the formation, respectively, in Jixian County, Tianjin, China.
the authors identified the Wumishan Formation as being lithologically dominated by microbial dolomite (Note: the protolith was microbial limestone in the study area (Song et al., 1991)). The classification of microbialite types from Riding (2000) and Mei et al. (2007), this study classifies microbialites in detail on the basis of their macroscopic textures and structures as stromatolithic microbial dolomite and non-stromatolithic microbial dolomite types and includes 11 subtypes (For details see Fig. 1).

In combination with a study on pores and vugs developed characteristics of microbial dolomite, the authors determined the reservoir rock types of microbial dolomite, including: 1) microbial dolomite associated with clots and stromatolites, which are layered clotted stromatolite dolomite, layered / randomed clotted stromatolite dolomite, pyramidal clotted stromatolite dolomite, small-columnar clotted stromatolite dolomite, palmate / phaceloid clotted stromatolite dolomite (Figs. 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2h); 2) microbes capture, binding clots forming the dolomites of coats type that is clots / sand-clastic microbial coated dolomite (Fig. 2i).

In terms of reservoir spaces development, the main reservoir spaces are dissolution pores of along the laminae boundary of microbialites associated with microbial laminae and clots (Figs. 2a, 2d, 2e, 2g, 2h, 2i). Secondly, they are intergranular dissolution pores and vugs of...
microbial framework and the structural and dissolution fissures that developed not regularity, relatively speaking (Figs. 2b, 2c, 2f, 2h).

In a word, through the above researchs, preliminary believed development of the reservoir spaces of microbial rocks mainly by its own structure, microbial framework, the paleokarst and filling degree of comprehensive controltion. The authors identified microbial dolomite as important deep oil and gas exploration targets of the Mesoproterozoic Wumishan Formation in Jixian County, Tianjin, China.

References