

The glutenite reservoir's lithofacies-diagenetic facies assemblages and geophysical property of the nearshore subaqueous fans in Bonan Sag

ZHANG SHAOMIN*^{1,2}, CAO YINGCHANG¹, ZHU RUKAI^{2,3} AND WANG YANZHONG¹

¹School of Geoscience, China University of Petroleum, Qingdao, 266580, Shandong, China

²Research institute of petroleum exploration and development, PetroChina, Beijing, 100083, China

³State key laboratory of enhanced oil recovery, Beijing, 100083, China (*author:zhangshaomin0813@126.com)

Comprehensively utilizing the methods of core observation, thin section identification, scanning electron microscope observation and an analysis of core geophysical properties, the lithofacies-diagenetic facies styles of nearshore subaqueous fans in the upper part of the fourth member of the Shahejie Formation (Es4s) in the north zone of the Bonan Sag has been studied, as well as the glutenite reservoir geophysical properties. The glutenite of nearshore subaqueous fans in the Bonan Sag develops lithofacies styles as matrix-supporting conglomerate facies, particle-supporting conglomerate facies, conglomerate-sandstone facies, pebbly sandstone facies, sandstone facies and mudstone facies, and diagenetic facies as strong compaction-matrix recrystallization, strong compaction, intense dissolution, tight cementation and transition diagenetic facies. On the basis of the division of lithofacies and diagenetic facies, the glutenite of Es4s of nearshore subaqueous fans in the Bonan Sag is summarized as 11 lithofacies-diagenetic facies styles, and the geophysical properties longitudinal distribution are researched under the constraints of lithofacies-diagenetic facies assemblages. The inner fan reservoirs mainly develop matrix-supporting conglomerate facies-strong compaction and lime-mud matrix recrystallization diagenetic facies and particle-supporting conglomerate facies-strong compaction diagenetic facies, whose geophysical properties are poor on the whole, mainly extremely low porosity-ultralow permeability reservoirs, forming the sealing rocks. The bottom of the middle fan lithofacies assemblages which are far away from mudstone layers are mainly conglomerate-sandstone facies-strong compaction diagenetic facies, pebbly sandstone facies-strong compaction diagenetic facies and sandstone facies-strong compaction diagenetic facies, all of which have relatively poor physical properties. The middle of the middle fan lithofacies assemblages which are far away from mudstone layers are mainly conglomerate-sandstone facies-moderate compaction and moderate dissolution diagenetic facies, pebbly sandstone facies-moderate compaction and intense dissolution diagenetic facies and sandstone facies-moderate compaction and intense dissolution diagenetic facies, all of which have good physical properties with general lower porosity-extremely low permeability reservoirs, forming hydrocarbon reservoirs. The near mudstone parts of middle fan and outer fan are mainly sandstone facies-moderate compaction and tight cementation diagenetic facies, therefore tight carbonate cemented crusts or mudstone layers between multi-stages fans are formed to be good cap rocks.