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## Optimized well spacing technique of mixed well type for tight gas sand in China

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With continuously deeper development of "Sulige" Gas Field, which is domestic typical representative of Tight Gas Sand, its development pattern has already changed from single vertical well development to multiple well-type development including vertical, cluster and horizontal well. How to optimize Well Spacing of multiple well type under complicated geological conditions is one of key technique problems for enhancing recovery rate of gas field. Based on the fine geological anatomy of dense well pattern test area using reservoir architectural analysis method, large-scale composite sand body of braided river is divided into 4-grade architectural elements, which is braided river system, composite channel sand body, single channel and point bar and optimizing well spacing technique targeting composite channel sand body, the second grade architectural elements, has formed. According to the differences of interior reservoir structure characteristic, three lithofacies types of the second grade architectural elements, which is superposition belt, transitional belt and inter-system belt is identified, and ancient landform controls the distribution of different lithofacies types. Reservoir pattern determine development well type: superposition belt suitable for the integral development of horizontal well, transitional belt suitable for the cluster well development, and inter-system belt suitable for the vertical well development of sweet spot, and quantitative recognition standard of various lithofacies has been established. The field application of such technique showed satisfactory results, 63 horizontal wells, 9 cluster well groups consisting of 5~7 wells, and 12 vertical wells, have been deployed, and numerical simulation result shows recovery rate of gas field is enhanced a lot due to mixed well type development especially horizontal well development. Research results instructed the next development of Sulige Gas Field, and provide reference for domestic gas reservoir of such type.

## Biography

Qunming Liu is currently a Reservoir Engineer in Research Institute of Petroleum Exploration & Development, CNPC. He received Master's degree in Petroleum Geology from China University of Geosciences (2009) and PhD in Petroleum Development Engineering from the Research Institute of Petroleum Exploration & Development (2012). His main research interests are natural gas development geology and tight gas development.

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