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Horizontal well geological optimization in tight sand gas field of braided-river facies

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Sulige gas field is a typical tight sandstone gas field of braided-river facies in China with features of poor reservoir property and strong reservoir heterogeneity. Horizontal well technology is an effective means to improve gas field development effect. The control of braided-river system zones distribution on effective sand bodies was analyzed quantitatively and the horizontal well geological target selection standards were formed respectively in superimposed zone and transitional zone of braided river system. Considering the poor applicability of conventional modeling method, a new modeling method is put forward called multi-stage constraints, hierarchical facies and multi-step models. The modeling method strengthens the prior knowledge control, reduces data interpretation uncertainty and improves the model's reliability. Based on the geological model, with 3D visualization technology, horizontal well were designed and well trajectories were optimized. It is pointed out that in superimposed zone, channel bars are developed with relatively high ratio and larger scale, similarly, effective sand bodies are enriched with massive and thick type. Thus, the horizontal wells there may be deployed uniformly with large-scale corresponding to straight or high angle trajectory. While in transitional zone, channel filling micro-facies are more developed and sand bodies are scattered and scarce, so horizontal wells there should be deployed cautiously with dessert type and the well trajectory is mainly ladder type. This geological optimization process of horizontal wells, combining multidisciplinary data such as logging and seismic data is more intuitive in image display is more convenient in data transmission and update and improves the effective reservoir drilling rate up to over 70% from previous 60%. This research can play a more reliable geo-steering function for horizontal wells while drilling and can enhance horizontal well exploitation effect. Furthermore, it may provide rapid and accurate reference for gas field development.

Biography

Guo Zhi has completed his PhD degree at Petro-China Research Institute of Petroleum Exploration and Development in 2014 and has engaged in his career for about 10 years. His major is in Oil and Gas Development Geology. He has made some progress in reservoir description, geology modeling, reserves classification and horizontal well optimization for tight sand gas. He has published more than 10 influential papers both home and aboard.

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