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^{PS}Typical Cenozoic Dextral Strike-Slip Characteristics of Tan-Lu Fault and Relationship with Oil and Gas in Eastern Laizhou Bay, Bohai Offshore Area of China*

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Abstract

Laizhou bay sag is located in the southern part of Bohai sea region and is a half-graben of Cenozoic developed on the basement of Mesozoic. The Tan-Lu fault extends across Laizhou bay sag by west fault branch and east fault branch and is the most complex and typical dextral strike-slip fault belt, striking in a NNE direction during Cenozoic. The movement of east branch fault was extremely active after Oligocene, resulting in the development of a number of NNE trending strike-slip faults and the complex fault belt made up of NE trending companion faults. The fault distribution within strike-slip fault belt is consistent with the brittle shear mode of dextral simple shear, the dextral drag fracture evidence can be seen on seismic variance slices. The analysis of fault acting times showed that the area experienced three major tectonic activities and formed three tectonic overturns of different time. Due to the impact of pre-existing uplift and regional distribution of dextral stress field, the deformation of the area is characterized by great difference and diversity, leading to the formation of multi-type structural styles, such as folds, compressional overturn structures, tilted fault blocks and flower-shaped structures.

Oil and gas discovery in this area has been focused on the Ed and Es formations of Paleogene. First of all, under the control of regional strike-slip stress field, the depocenter of Laizhou bay sag migrated during Paleogene and formed a northeast subsag, and at

the same time the strongly active faults controlling sag and the associated faults of strike-slip fault produced large vertical offset and tilting activities, leading to the rapid accumulation and deposition of sediments in the downthrown block of faults and forming the good hydrocarbon source rock in the strong reductive environment, providing the material foundation for oil and gas accumulation. Second, strike-slip movement formed a variety of structural types, these structures have characteristics of large closure area and good closure shape, which provided the large storage space for the oil and gas accumulation. Finally, Tan-Lu fault is a deep, long-term active fault and showed extensional features during the Paleogene, and wrench deformation characteristics of Neogene, consequently developed strike-slip companion faults constitute the good hydrocarbon migration channels of Paleogene, and the faults developed during Neogene play the role of sealing process.