

Organic-Geochemical Evaluation and Oil Source Analysis for Well Fang 4 in Block-Fault Fangzheng Structure

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The thickness and distribution of hydrocarbon source rock and oil source of the Fangzheng Structure are still not known even after the breakthrough in the exploration of Yi-Shu Graben Structure by Well Fang 6. Therefore, Well Fang 4 was drilled in 2007. According to mud log statistics data of Well Fang 4, the dark colored shale is not developed in the second interval of Baoquanlin Group with a total thickness of 124 meter and a shale to formation ratio of 14.5%; the dark colored shale developed in the first interval of Baoquanlin Group with a total thickness of 949 meter and a shale to formation ratio of 67.5%. The upper part of the Xinan Group does not have developed dark shale, while the lower part has a total thickness of 167 meters, with a shale to formation ratio of 41.6%. The Cretaceous strata has less developed dark shale with a total thickness of 13 meters and shale to formation ratio of 8.5%. The coal bed of the Xinan Group discovered in Well Fang 4 is totally 30 meters. From the point of view of oil generation potential of source rock, Xinan Group has its oil generating capability. Correlation of oil source shows that crude oil probably originated from the mature coal bed of Xinan Group and of the Cretaceous Strata in the depression. Organic geochemical characteristic evaluation:

Baoquan Group: In the Baoquan Group, Organic carbon value is 1.304 to 2.1%, pyrogenic hydrocarbon origination value 1.7-3.25mg/g, hydrogen index 122-152mg/g, chloroform bitumen "A" value 0.023-0.0304%. The ratio of conversion between chloroform and organic carbon is less than 2%.

Xinancun Group: In the Xinancun Group, Organic carbon value is 1.86 to 9.22%, hydrocarbon origination value 15.71-44.18mg/g, hydrogen index 271-1741mg/g.

Hydrocarbon Geochemical Character: Oil property of Well Fang 4: between depth 3214.00~3234.00m, oil density is 0.787~0.801(g/cm³), viscosity 1.07~1.0 (mPa.s), wax content 6.5~6.9 (%), freezing point 10~13. Oil in this well is volatile and less viscous.

Oil Source Analysis: Oil in Well Fang 4 is close to the source rock of Xinan Group. But their maturity are different. The coal rock formation interval of Xinancun Group is at a depth of 3175m, OEP=1.6, Pr/Ph=3.2. Its Shale interval is at a depth of 3205m, OEP=1.65, Pr/Ph=5.35.

Oil of Well Fang 4 did not likely come from the same depth interval in Xinancun Group. Our analysis shows that oil in Well Fang 4 Originated from a more mature source.