Using Quantitative Grain Fluorescence technique to reveal hydrocarbon accumulation history of the Kela-2 dry gas field, Kuqa Foreland Basin, China

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Based on the analytical techniques and principles of Quantitative Grain Fluorescence(QGF®), a systematic sampling and quantitative fluorescence analysis was conducted on the Kela-2 dry gas reservoir, Kuqa Foreland Basin, West China. Combined with hydrocarbon inclusion analysis, we believe that there had formed an ancient oil zone of about 350m oil column in the current gas and water zones. Both the QGF Index and QGF-E Intensity profiles delineate a residual/palaeo oil-water contact (OWC) at the depth of 3994.5m, and the palaeo OWC is lower than the current gas-water contact (3935m). Above the inferred OWC, the QGF-E Intensities are bigger than 50 and QGF Index bigger than 4, and both the QGF Index and QGF-E Intensities profiles display upwards increasing trend, which correspond to the characteristics of fluorescence profile of palaeo oil reservoir. The QGF-E spectral signature is typical of that from known residual oil enriched with polar and asphaltene. In reservoir samples within the palaeo oil intervals, hydrocarbon inclusions are well developed with GOI above 60% . The residual bitumen and fluorescence show in the pores and cracks further proves the existence of palaeo oil reservoir. Above 3990m, the S_0, S_1 and S_2 values of rock pyrolysis are relative higher with the maximum value of 0.4 mg/g, which shows the characteristics of oil layer with depth range bigger than current gas column height. This is quite consistent with what we get from QGF data. These evidence all prove that there had formed a palaeo oil reservoir about 350m height in the Kela-2 structure. While the palaeo oil was destroyed by the fault which penetrated the salt caprock, and then the depth increased and the fault was sealed by salt plastic movement and preserved the late charging dry gas.