New Data on the Deep Subsurface of the Kizylkum Downwarp

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(Neftegazovaya Geologiya i Geofizika, no. 8, p. 10–15, 1980)

The Kizylkum downwarp is a large structural element within the West Turkmen oil-gas basin that occupies an onshore area of 70 by 70 km. It plunges to the west and southwest, extending more than 100 km into the Caspian Sea. The section here is a clastic-carbonate complex of Mesozoic sediments with a thickness estimated at 20-25 km. The downwarp is framed on the northeast and southeast by the Balkhan-Apsheron and Gogran-Dag-Okarem zones of highs of Neogene folding where all the known oil and gas fields of Southwest Turkmenia occur.

Geophysical exploration was carried out on the downwarp in the period 1948-64. Seismic surveys were not very successful because of the extensive presence of barchan dunes.

Seismic surveys using the reflection and common depth point methods in 1967-78 disclosed an anticline cut by faults. Field reconnaissance in 1977 disclosed a mud volcano and some outcrops that suggested another anticline at depth. Then gravity surveys in 1977-78 defined positive gravity anomalies that coincide with geomorphic features.

The presently available geological information suggests that in the Neogene-Quaternary sediments of the Kizylkum downwarp there are anticlinal highs that formed under the influence of those same processes that formed the adjacent Balkhan-Apsheron and Gogran-Dag-Okarem structural zones. At least three lines of folds are present (A, B, and C on Fig. 1).

The highs recognized here in the Kizylkum downwarp are favorable for oil and gas. Their sections are composed of those same Apsheron-Akchagyl and Redbed sediments with favorable reservoirs and seals as are the sections in the adjacent regionally oil-gas-bearing Pri-Balkhan and Gogran-Dag-Okarem regions. Also, the Kizylkum downwarp is a good analog of the Baku Archipelago and adjacent onshore parts of Azerbaydzhan. This is expressed in their commonality of geologic history, similarity in stratigraphic sections, same basic regional tectonics, and the presence of mud volcanoes.

From a comparison with the similar oil and gas fields of southwest Turkmenia and Azerbaydzhan, it follows that in the Kizylkum downwarp pools and multi-pay fields may be associated with highs and strat traps as well as fault traps. See Fig. 2.