Exploration for Non-Anticlinal Oil Traps in the Lower Carboniferous of the Orenburg Region

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Paleogeographical studies in the Orenburg region indicate the existence during Viséan time of various facies environments characterized by a wide distribution of local lithologic replacements of sandy-silty rocks and corresponding traps.

Paleo-relief was an important factor in the development of non-anticlinal traps. At the beginning of Viséan time the Kamsko-Kinel system of troughs, which extended over the entire Volga-Ural region, was compensated, being filled by clastic deposits. In the north and central parts of the province, processes of denudation were active; biohermal bodies were expressed as positive forms of the relief. In the south (Orenburg area), processes of continental, near-shore marine, and marine accumulation predominated; denudation was subordinate. In late Bobrikov time began a transgression that buried the paleo-relief.

The Viséan paleo-relief was reconstructed on a basis of interpretation of variations in thickness and lithofacies of the Radayev and Bobrikov sediments. A marker for this study was a limestone at the base of the Tula horizon; it was studied in more than 500 wells. Several paleogeomorphological features were recognized. See Figs. 1 and 2.

I. Elevated area, located at paleo-elevations of more than 50 m, was characterized by a predominance of denudation processes; it was a source of sediment. See Fig. 1 for location of Roman numerals.

II. Baytugano-Alyab’yeyskoye subaerial plain. In the modern structural plan it is on the southeast flank of the Tatar arch and on the Vostochno-Orenburg high. Thickness of the clastic sediments of the Early Carboniferous here is a minimum, ranging from 5-10 to 30 m. Paleo-elevations ranged from 5-10 to 50 m. The most favorable conditions for non-anticlinal traps are present in two categories of relief: Bol’shekinel elevated area and the erosional net. Valleys up to 50-75 km in length are traced: Baytuganskoye (a), Pashkin (b), Ashirovsko-Umir (n), and Alyab’yevskoye (g).

III. Mukhanovo-Yerokhov alluvial-deltaic zone. This zone corresponds with a downwarp of the same name. The geomorphological model of a finger-like delta was constructed from data on thickness and sandstone content of the Viséan. Between the main channels were branches, which migrated across the deltaic plain creating a complicated distribution of reservoirs.

IV. The Bobrovsko-Pokrov archipelago of accumulative forms was a near-shore bank. Thickness of these sediments ranges from 20 to 50 m.

V. Zone of open shelf. Carbonate sediments predominate in this area.

The Radayev and Bobrikov sediments of the Viséan are productive in the study area. The pools occur in stratigraphic traps in zones II, III, and IV. Pools are more abundant in the deltaic deposits of zone III.