Oil-Gas Productivity of Steep and Overturned Flanks of Folds of the Cis-Carpathians

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The oil-gas-condensate fields of the Inner Zone of the Cis-Carpathian downwarp occur on anticlines that formed in connection with overthrusting. As a result their northeast flanks are generally steep or overturned. Some are complicated by faulting.

In many places these steep and overturned flanks contain commercial oil and gas. Yields of oil at 1.5 to 120 tons/day and gas at 120 thousand m$^3$ have been recovered. The best flows of oil were obtained from Vygod sediments of the Dolina deep fold, and the best flows of gas from the Yamnen sediments of the Tanyav fold of the Beregov overthrust. Wells targeted on steep to vertically dipping reservoirs must be deflected to penetrate the productive section.

Drilling in the Dolina field disclosed a clearly expressed steep and overturned flank along the entire length of the fold, which formed by overthrusting of the Dolina fold onto the Severo-Dolina fold. In the northwest part of the field the frontal part of the overturned fold is separated from the main part by a longitudinal fault. See Figs. 1 and 2.

Several horizons thicken on the steep and overturned flank of the fold. This is particularly true for the lower Menilitov. Its normal thickness is 200-220 m, whereas on the overturned part it is up to 650 m thick.

In several other fields of the Cis-Carpathian downwarp (Lopyanetsa and Vitvitsa folds of the Scythian zone, Severno-Dolina, Nizhne-Strutyn, and other deep folds), the overturned flank has been separated from the main part of the fold for a considerable distance and forms a recumbent structure of the anticlinal type. Such structures are excellent traps for commercial pools.

The overturned flank of the recumbent synclinal fold of the Vitvitsa structure is an independent asymmetrical fold in the Tanyav field. This fold is cut by faults into three blocks. The gas condensate pool is only in the Paleogene Yamnen Formation. The overlying Upper Cretaceous and underlying Eocene are completely water-bearing. Initial formation pressure in the pool exceeded the hydrostatic pressure. The seal for the pool is the clayey rock of the Stryy Formation of the Upper Cretaceous.

Exploration for small pools associated with steep and overturned flanks of folds may be very effective. Prospective targets are the Menilitov sediments in the Dolina, Spas, Orov-Ulichnyan, Bitkov, and Gvizdetsa fields.