Method of Exploration and Prospecting of Large Oil Fields in Bashkiria

G. P. Ovanesov

In the territory of Bashkiria the main exploration objectives are buried structures and projections of reef masses in which large oil fields occur.

On the basis of tectonic characteristics and special features for exploration of oil fields, the territory of Bashkiria can be divided into two large parts: the platform, and the Cis-Ural downwarp with the adjacent folds of the west flank of the Urals. See Figure 1.

The main features of the methods of geological exploration are briefly as follows:

In the area of the southeast flank of the Tatar dome, where large sharply expressed structures in the Artinsk sediments correspond well with structures in the Carboniferous and Devonian, preparation for deep prospecting drilling is carried out by structural exploration drilling. To this area are referred the Tuymazy-Serafimov and Shkapov regions, the area between them, and the Tuymazy region.

In the extreme eastern part of this area, where no clear correspondence is observed between the Artinsk structures and those of the Carboniferous and Devonian, preparation for prospecting is carried out along marker horizons of the coal-bearing formation by means of deep structural wells. In this case together with revealing the structural form, the lithofacies composition of the coal-bearing formation and its oil capability are also studied. Prospecting of the Devonian sediments is carried out on structures distinguished in the Lower Carboniferous. Detailed seismic reflection surveys are made here to speed preparation of areas for commercial prospecting.

In the Birsk saddle, where the main commercial oil-bearing horizons up until now have been in the coal-bearing horizon, there is a good correspondence of the Artinsk structures with those of the coal-bearing formation, and a discordance between them and the structural plan of the terrigenous Devonian. The same relationship between these structural stages is also observed along the entire northwest margin of Bashkiria (region of Arlan, Kaltasov, and Kuzbaevo).

The preparation of areas for commercial prospecting in these regions is accomplished first by structural-exploration drilling. A supporting marker horizon for this work is the top of the Artinsk stage.

Areas prepared by structural-exploration drilling on the Artinsk sediments are transferred to commercial prospecting for oil exploration in the Lower Carboniferous. Exploration of structures in the Devonian sediments is carried out by deepening individual prospecting wells located on the crests of uplifts along the coal-bearing sediments or according to the results of seismic surveys.

In the area of the Bashkir dome, where the structural plan of the Artinsk sediments does not correspond to the tectonics of the Devonian, exploration for structures in the latter requires drilling of deep structural wells for locating the terrigenous Devonian and also for exploration of lithologic and stratigraphic pools.

Exploration of structural and other deposits in the Devonian in the areas of the Bashkir dome must be carried out by the method of laying out profiles of deep structural wells located radially with respect to the outline of the dome. The wells must be placed from the center to the periphery, beginning from the Kushkul field, which occupies an almost central position on the dome.

In the area of the monoclinal flank of the platform, the structural relationships of the Paleozoic sediments are assumed to be approximately the same as on the Birsk saddle. The main exploration objective in this downwarp is the terrigenous unit of the Devonian, because the coal-bearing formation here is not thick (5-10 m) and is represented by silty-clayey rocks. Preparation of areas for commercial prospecting of the Devonian sediments here is carried out by mapping on the Artinsk stage, but only the large structures reflecting the deep tectonics are placed in deep drilling.

Further improvement in methods of exploration of Devonian structures on the platform is possible by improving seismic surveying as the fastest and cheapest means of prospecting coordinated with drilling small-bore deep exploration wells to the Devonian sediments.

Taking into account the structural discordance in the Paleozoic, it can be assumed that many uplifts in the Devonian are not