Exploration for New Oil and Gas Fields in the Clastic Devonian of the Volgograd Area

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Beginning in 1959–60, the goals for proving oil and gas reserves in the Volgograd area were not met. From 1959 to 1963 five small oil and gas pools were discovered with total gas reserves (categories A plus B plus C1) of 3 billion m³. Results were unsatisfactory largely because of the absence of a backlog of structures prepared for commercial prospecting.

Up until 1959 the preparation of structures was accomplished by structural drilling on the tops of the relatively shallow occurring Carboniferous sediments. At this time the entire right-bank area of the Volga had been studied by structural drilling, and it had been established that all the more or less large structures had already been detected and that there was no basis for expecting the discovery of large new structures in the upper structural stage, which also includes the Carboniferous and Upper Devonian. In connection with this the question has arisen as to exploration of the deeper occurring sediments of the clastic Devonian. It has now been established that the structural plan of the clastic Devonian does not correspond with that of the Carboniferous. Therefore, it was decided that the deep parametric wells should extend to the basement, or to maximum possible depth, and the basement surface be studied by refraction surveying.

Since 1960 more than 60 parametric wells with a total meterage greater than 210,000 m have been drilled, and more than 6,000 km of refraction profiles have been run. The parametric wells, just as the refraction profiles, were at first located across the main trend of the rocks that comprise the upper structural stage. The regional work was carried out largely within the area of the Dono-Medveditsa swell of the Volga monocline and adjacent regions of the Caspian depression.

More than 12 projections on the basement are now known. Two of these (Zadon and Kudinov) have been confirmed by the drill. The Zadon projection has proved to be not favorable; not only the clastic Devonian but also the carbonate Devonian are absent on it.

The Kudinov projection was first distinguished on a basis of two refraction profiles, after which it was confirmed by parametric wells 82 and 83. The Carboniferous rocks on it dip monoclinally to the SE; the amount of plunge between wells 82 and 83 is 600 m. The monocline is complicated by weakly expressed terraces (Figs. 1 and 2), the position and form of which have been studied inadequately. The rocks of the middle Frasnian as well as those of the clastic Devonian are sharply reduced in thickness in well 83; the monocline flattens out rapidly and already in the Pashiy sediments a flexure is present. The amplitude of the west flank reaches 100 m here.

Testing of well 83 established oil-gas productivity on the Kudinov projection. A flow of gas with a large amount of condensate was recovered from the Vorob’ev horizon (3087–3079 m interval). This same well yielded oil from the Pashiy horizon (2876–2865 m interval). By the middle of 1965 several wells had been drilled on the Kudinov projection; these served to outline the structure.

Commercial oil has also been found in the Severo-Dorozhkin area. Drilling here also indicates a complex structure of the clastic Devonian and the possible presence of faulting and tectonic shielding of oil pools.

New data have also been obtained from well testing in the Shlyakhov area. Well 175 yielded a flow of 3–5 tons of oil per day from the Pashiy horizon; well 171 yielded oil with 50% water also from the Pashiy horizon. Lithologic and tectonically shielded traps are also probably present here; however, they are likely to be small.

Weak flows of oil have been recovered from the Molosov horizon in Mishin well 32 and from the Pashiy horizon in Novo-Korobkov well 92.

All this indicates a regional oil-gas productivity for the clastic Devonian and the necessity for pressing exploration here particularly on the Kudinov, Logov, and Romanov projections of the basement.

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