New Data on the Geology and Oil-Gas Prospects of the Western Part of Central Asia

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MAIN GEOLOGIC FEATURES

The geology of the western part of Central Asia has been poorly studied. As a result of geological and geophysical operations carried out by many organizations and scientific research institutions, new data have now been obtained which reveal the main geologic features of this region.

The area under examination is diverse geologically. Its main structural elements are (1) the Karakum epi-Hercynian platform, occupying a vast area of the Turkmen SSR, the western part of the Uzbek SSR, and adjacent regions of the Kazakh SSR; (2) a deep, complex downwarp of the basement filled by a thick unit of Pliocene and Quaternary sediments (West Turkmen depression); and (3) marginal downwarps (Cis-Kopet Dag and Cis-Gissar) adjacent to the Karakum platform. These main tectonic elements are bounded by folded areas where Paleozoic and Meso-Cenozoic rocks crop out. Such areas include the Kopet Dag, Bol’shoe Balkhan-Kubadag, Gissar, Sultan-Uizdag, and West Tyan-Shan systems.

MARGINAL DOWNWARPS

The Cis-Gissar and Cis-Kopet Dag marginal downwarps have a complicated structure.

Within the Cis-Kopet Dag downwarp two zones are clearly distinguished: an inner and an outer. The inner zone, adjacent to the large flexure of the folded Kopet Dag, the structure of which has been described in many works of P. I. Kalagin and other investigators, is characterized by the presence of sharply expressed linear structures in the Tertiary sediments. The angles of dip of the rocks in this zone reach 50-60°, and the structures are not large.

There are data on the outer zone along the profile Ashkhabad-Cernyy Zavod and in the region of I zgant. In the latter a relatively gentle uplift of N-W trend has been revealed by seismic and drilling work; it has been traced 15 km. The amplitude of the fold is 150 m for the Miocene sediments and 300 m for the Paleogene.

A great thickness has been established for the Tertiary in the outer zone; according to the data of Z. A. Abdullaev it reaches 3500 m. According to geophysical data worked up by Yu. N. Godin and A. A. Borisov, the depth to the Paleozoic basement in this region is about 9-10 km. The boundary between the outer zone of the Cis-Kopet Dag downwarp and the Karakum platform is drawn where the angle of dip steepens and the thickness of the sediments increases.

The Cis-Kopet Dag downwarp is complicated by the presence of the Kizyl-Arvat transverse projection, within which the shallow occurrence of the Upper Cretaceous has been established. The Cis-Kopet Dag downwarp is 600 km long and has a maximum width on the order of 60 km.

The Cis-Gissar downwarp has not been studied sufficiently. Drilling in its NNE part in the Yakobag region has established a thick (more than 1000 m) unit of molasse of Neogene-Quaternary age.

On the SSW continuation of the downwarp a number of narrow elongate sharply deformed folds have been determined. They have Upper Cretaceous sediments at their crests. To this same downwarp is referred the Kerki-Dag structure, which has been drilled. At 2800 m the drill had not yet passed through the Neocomian sediments. This fold is broken by a large upthrust with a slip of 500 m. The Cis-Gissar downwarp is adjacent on the NE to the Paleozoic massiv of the Zaravshan Range; on the SW it extends along the Amu-Darya River. Its farther continuation is not known. This downwarp joins with the folded zone of the spurs of the Gissar Range along a system of faults, where Cenomanian sediments in some areas are in contact with the Bukhara stage of the Paleogene.

KARAKUM PLATFORM

The above mentioned zone of marginal downwarp (Cis-Kopet Dag, Cis-Gissar) and also the folded area of Bol’shoe Balkhan-Kubadag adjoin the Karakum platform on the north. The latter is bounded on the east by exposures of the Paleozoic massivs of the western Tyan-Shan and on the north by the Sultan-Uizdag and Mangyshlak zones.