Dnieper-Pripyat Gas-Oil Province

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The Dnieper-Pripyat province coincides with the Dnieper-Pripyat aulacogen, which consists of the Dnieper-Donets depression on the southeast and the Pripyat depression on the northwest, separated by the Chernigov-Bragin high; see Fig. 1. The aulacogen formed during the Hercynian tectonic epoch in late Devonian-Early Permian time. Deposition within the graben was commensurate in scale with that of geosynclinal areas.

The central graben of the aulacogen is 900 km long and 70-130 km wide. The border faults have displacements of 1-5 km and show up on the M-discontinuity.

Ideas on the pre-rift basement come from geophysical surveys within the depressions and from exposures on the Ukrainian shield immediately on the southwest. In the border areas the surface of the basement dips toward the central graben at angles of 1-2°, and then on approaching the border faults this increases to 7°; see Fig. 2. Then this surface subsides stepwise toward the deepest part of the graben where it is at 12-17 km depth, and perhaps 20-25 km.

Stratigraphy. Deposition of sediments in the aulacogen began in the Middle Devonian and continued with varying intensity to Anthropogene time.

In the Middle Devonian and at the very beginning of the Late Devonian paleogeographic and paleotectonic conditions at the site of the aulacogen were similar to those on the East European platform. This suggests the the graben had not yet began to form.

Active graben formation is associated with a sharp increase in rate of sedimentation. In the Late Devonian this rate increased to 147 m/million years in the Pripyat depression and 150 in the Dnieper-Donets. In the Early Carboniferous it dropped to 22 m/million years in the Pripyat and then continued to decrease. The rate in the Dnieper-Donets depression continued high and rose to 170 in the Early Carboniferous.

In the Pripyat depression 80% of the volume of the sedimentary fill is Devonian; its thickness is 4 km. In the extreme northwest part of the Dnieper-Donets depression the Devonian also dominates; toward the east, however, the Carboniferous begins to prevail, and near the Donets Basin its thickness is 10 km.

In the depression areas the Devonian is up to 5 km thick; it is complete stratigraphically including the evaporites. On the basement highs the Devonian is reduced to 1,000 m or less, or is completely absent. The evaporites commonly pass into sulfate-carbonate and clastic rocks on the highs and in the border areas. Thick volaniccs are present in the Devonian of the Dnieper-Donets depression, in some places accounting for 80% of their volume.

Two salt units are present in the Upper Devonian, which is otherwise composed of clastics and some carbonates. The lower salt is the thicker and is widespread; it forms salt domes, some of which are 10 km high. It is Frasnian in age. The upper salt is thinner, less extensive in occurrence, and makes salt domes only in the Pripyat depression. It is Famennian in age.

At the top of the Devonian are marly clays that rest on an erosion surface on the upper salt. Total thickness of the Devonian section is from 0 to 6 km.

During the Touraisian and early Visean, carbonate rocks were deposited in the southeast part of the Dnieper-Donets depression and continental clastics in the northwest part. Their thickness ranges from 1,800 m in the south to 40 m in the north.

Late Visean and Serpukhov time of the Early Carboniferous was marked by an extensive transgression with deposition of clastics in a shallow sea. This marine basin extended well beyond the graben.

The basin of deposition became restricted in Middle Carboniferous time. The amount of sandstone in the section became greater, and some coal beds were deposited. On the southeast the thickness of the Middle Carboniferous is more than 2,000 m, but on the northwest it is only 400 m.

Further regression took place in the Late Carboniferous, and variegated clastics were deposited. Thickness ranges from 2,600 m in the southeast to 40 m in the northwest.