GEOLOGICAL SCIENCES

GEOLOGICAL FEATURES OF THE NARIZHNIANSKE OIL AND GAS CONDENSATE FIELD

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DOI: https://doi.org/10.30525/978-9934-26-568-6-1

The Narizhnianske oil and gas condensate field (OGCF) was launched in 1984 with exploration well 1.

The geological structure of the Narizhnianske field consists of Precambrian crystalline rocks and sedimentary strata of the Paleozoic, Mesozoic, and Cenozoic groups.

Tectonically, the structure of the Narizhnianske OGCF is located in the northern sidewall zone of the Dnipro-Donetsk Depression (DDD) and is confined to the Narizhniansko-Ogultsivska structural zone, which can be traced along an unconformable dip with an amplitude of 150 m to 300 m. Within this zone, the Middle-Lower Carboniferous structural uplifts are developed, which are grouped into latitudinal shafts formed by crystalline basement blocks. This zone encompasses the following areas: Voitenkivske, Narizhnianske, Rogivske, Shylivske, Burivske, Ogultsivske, Pivdenno-Borchanivske, and Kaponivske uplifts.

The structures are mostly small in size, shielded from the north by a north-dipping reverse drainage and a submerged thickness of Mesozoic-Lower Permian-Upper Carboniferous sediments.

The southern wings of the structures are elongated, while the northern wings are short, adjacent to the dumps, or almost absent (Narizhnianske, Ogultsivske, Yuliivske, etc. uplifts).

The structure contains hydrocarbon reservoirs that are tectonically and lithologically shielded and limited by gas-water contacts confined to sandy-carbonate formations.

Uncoordinated discharges in the Narizhnianska area and adjacent fields fulfill their main function – reliable screening of traps, preservation of hydrocarbon accumulations along the monocline side in the presence of low-amplitude semifolds.

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Exploratory drilling in the Narizhnianska area began in 1982. A total of 15 exploration wells were drilled, 14 of which were abandoned for geological reasons (wells 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 18), and well 1 was put into production. Later, three more wells were drilled – 21, 33, 35.

Well 1 was put into production in 2000 at the B-12 horizon with a gas flow rate of 74 thousand m^3/day at pressures in tube side and annular channel of Pts – 21.0 MPa and Pan – 22.5 MPa.

Well 21 was put into production in 2001 at the C-5-7 horizon with a gas flow rate of 118 thousand m^3/day at pressures in tube side and annular channel of Pts – 26.0 MPa and Pan – 26.4 MPa.

Well 33 was put into production in 2009 at the C-7 horizon with a gas flow rate of 14 thousand m^3/day at pressures in tube side and annular channel of Pts –17.0 MPa and Pan – 20.5 MPa.

Well 35 was put into production in 2009 at the C-7 horizon with a gas flow rate of 45 thousand m^3/day at pressures in tube side and annular channel of Pts – 18.2 MPa and Pan – 18.5 MPa.

The results of exploratory drilling at the DDD field show that currently, multi-layer fields under development are quite promising in terms of additional exploration. Additional exploration of hydrocarbon reserves in multi-layer fields provides the bulk of the increase in reserves in Ukraine [1].

In many multi-layered fields that have been developed over a long period of time, new hydrocarbon reservoirs have been discovered during production drilling that occurs within previously established oil and gas contours [2].

The authors' analysis of the localization of multilayer fields concerning structural and tectonic zones within the entire DDD revealed that, in addition to the subzone under consideration, multilayer fields gravitate to other tectonic elements: the mobile subzone of the Southern nearshore zone (Kremenivske, Lychkivske, Vynohradivske, Pereshchepynske, etc. fields); to the subzone of large shafts and depressions of the axial part (Yablunivske, Skorobahatkivske, Hlynsko-Rozbyshivske, etc. fields); to the northern side zone of the DDD (Yuliivske, Skvortsivske, Narizhnianske, Druzhelyubivske, etc. fields) [2].

Thanks to the study and clarification of the geological structure of the Narizhnianske OGCF, well 34 was drilled, tested, and commercial oil inflow was obtained.

Well 34 was put into production in 2010 at the B-20 horizon with an oil flow rate of 18 tons per day at pressures in tube side and annular channel of Pts – 17.5 MPa and Pan – 11.0 MPa.

In [3], the Narizhnianske OGCF had 5 operational wells (four gas condensate wells 1, 21, 33, 35, and one oil well 34). Gas and condensate deposits of the B-12, C-5, C-7 horizons, and oil deposits of the B-20 horizon were being developed.

Gas condensate wells 1, 21, 33, and 35 are connected to the gas pre-treatment unit of the Narizhnianske OGCF. Oil well 34 is connected to the oil preparation unit.

It is worth mentioning that the Narizhnianske OGCF is depleted, as most of the fields of JSC «Ukrgasvydobuvannya» are at the final stage of development. Therefore, the problem of ensuring optimal hydrocarbon extraction from depleted fields remains relevant. One of the ways to solve it is to study and clarify the geological structure of the DDD fields, which will allow finding additional reserves, including new hydrocarbon deposits.

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