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Features of the Geological Structure of the Eastern Ustyurt's Jurassic Deposits

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Abstract: This article examines the features of the geological structure of the Jurassic deposits of Eastern Ustyurt. Terrigenous deposits of Lower Jurassic age are noted to be of low thickness throughout Eastern Ustyurt. The sediments are composed predominantly of sandstones and siltstones, with a high content of carbonized residues. The Lower Jurassic sequence is composed of interbedded terrigenous rocks (sandstones, mudstones, siltstones, gravelites), while a clearer differentiation of sediments and the presence of pure differences are observed in comparison with the overlying Upper and Middle Jurassic deposits, which is reflected by the presence in the section of thick up to 1149 (Karaaudan) m and more layers of sandstones and clays.

Keywords: Lower Jurassic, sedimentary cover, foundation, sandstone, siltstone, trough, Kossor. thickness of sediments.

The territory of the Ustyurt region is completely covered by small- and medium-scale gravimetric surveys with large-scale detailing of individual areas. The gravity field of the Ustyurt region is determined by the total influence of density inhomogeneities of the basement and the boundaries of the sedimentary cover. Here the South Aral zone of predominantly positive anomalies, the North Ustyurt minimum, the Central Ustyurt maximum zone and the South Ustyurt Assakeaudan minimum are distinguished [1; p.17].

Jurassic deposits occur with erosion and angular unconformity, represented by three sections, the stratigraphic completeness and thickness of which vary from west to east.

Terrigenous deposits of Lower Jurassic age are noted to be of low thickness throughout Eastern Ustyurt. The sediments are composed predominantly of sandstones and siltstones, with a high content of carbonized residues.

The rock is heavily clayey in places, spotted, weakly layered, with abundant inclusions of plant remains. Sandstones are light gray, gray, fine- and fine-grained, dense, micaceous-clayey cement of the pore type, with a gradual transition to siltstone with poor visibility porosity. The siltstone is light gray, strongly clayey, slightly calcareous, slightly mica, with streaks of gray mudstone-like clays and inclusions of charred plant remains.

In well No. 3p Kossor in the interval 2472–2482 m L.S. Khachieva encountered the following spore-pollen complex: Cyathidites minor Couper, C.junctus [K.-M.] Alim, Monosulcitessp., M.

Subopanulosus Couper, Disaccites, etc. , which makes it possible to date the age of the host sediments as Lower Jurassic.

The ratio of iron forms suggests that weakly reducing conditions prevailed during the period of accumulation and transformation of Lower Jurassic sediments. The reservoir properties of the rocks are characterized by the following indicators: total porosity - 9.2%, open -8.6%, density within 2.43 g/cm3, no permeability.

From the Lower Jurassic age, humidization of the climate and reduction of arid zones began; sedimentation took place in a desalinated shallow basin in a warm, humid climate.

The thickness of Lower Jurassic deposits decreases from northwest to southeast. If in well No. 1 Kindyksay the thickness of sediments is 172 m, then within the Kossor area it is 124–157 m, in the East Assakeaudan area it is 76–98 m.

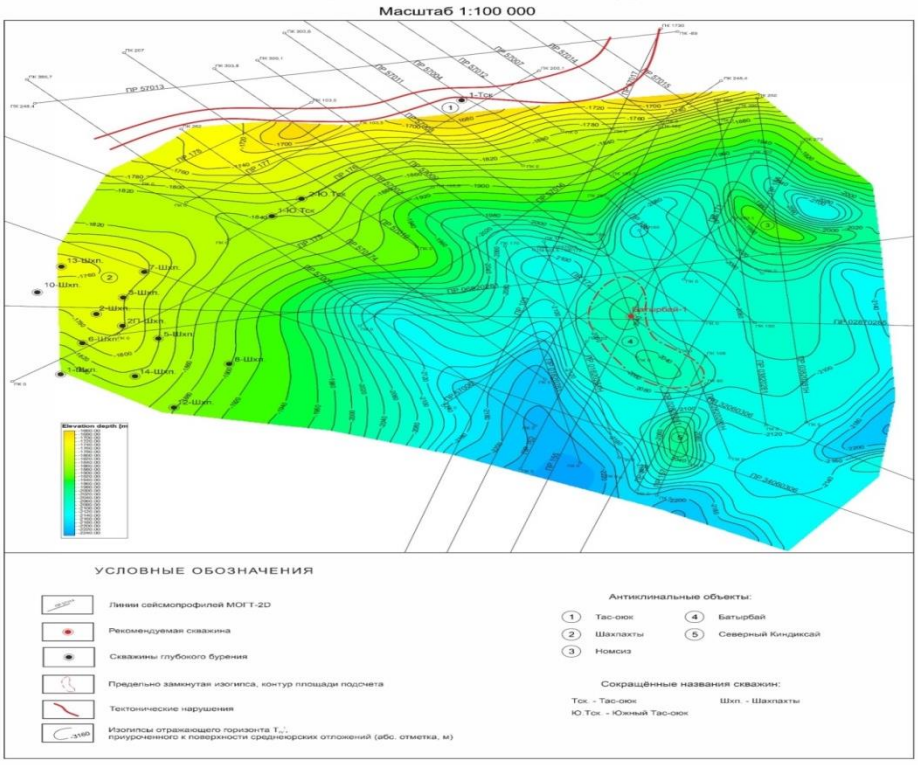
Middle Jurassic deposits within the investment block are widespread and are represented by undifferentiated Aalenian-Bajocian and Bathonian stages.

Lithologically, the Middle Jurassic deposits are represented by a terrigenous sequence of interbedded gray sandy-silty-clayey rocks.

The Aalenian-Bajocian stage is represented by a frequent alternation of sandstones, siltstones and clays with an abundance of carbonized plant remains and thin layers of coal (2–4 cm). It is characterized by thin horizontal bedding and lens-shaped microbedding. The thickness and lithological composition of the rocks vary greatly, which is associated with the continental nature of the genesis of sediments.

The Bathonian stage in the lower part is represented by sandstones with thin interlayers of gravelstones, in the upper part - by frequent alternation of gray and dark gray sandstones, siltstones and clays. The rocks are rich in charred plant remains and pyrite.

The sandstone is light gray to gray, quartz-feldspar, fine to coarse-grained, micaceous, dense, polymictic, with mixed carbonate-mica-clayey cement, poorly sorted in the Aalenian-Bajocian and better sorted in the Bathonian sediments.



Picture.1. Structural map of the area of Batyrbay along the reflecting horizon TIV, confined to the surface of Middle Jurassic deposits.

The mudstones are dark gray to black, silty, micaceous, with inclusions of pyrite crystals. The age is palynologically substantiated by various researchers. In well No. 2p Shakhpakhty V.V. Kutuzova identified the pelecypod Astarteminima Philips, indicating the Bathonian age of the host rocks. The reservoir properties of the rocks are characterized by the following indicators: total porosity - 11.6%, open - 10.75%, density within 2.38 g/cm3, no permeability. Torg is 0.58%, chloroform bitumen "A" is 0.02%. Within the investment block, the thickness of Middle Jurassic deposits varies from 360 m (No. 1 Kossor) to 433 m (No. 3 East Assakeaudan).

The greatest thicknesses of Kimmeridgian Tithonian deposits were noted in well. 1P Samskaya (128 m), in well 1 Almambet and on the Nikolaevskaya area (up to 228 m) in the central part of the Assakeaudan trough outside the study area (Fig. 2.6.) In the Kimmeridgian-Tithonian time, such large troughs as Sudochiy, Alan depression, have practically lost their importance as the main zones with maximum power [2; p.103].

The greatest thickness of Kimmeridgian-Tithonian deposits (up to 219 m) was recorded in the central part of the Assakeaudan trough.

Upper Jurassic deposits, conformably overlying rocks of Middle Jurassic age, were uncovered by all deep wells and are represented in the Callovian-Oxfordian and Kimmeridgian-Tithonian volumes.

Callovian-Oxfordian deposits [J3cl-Oxf] are represented mainly by clays with interlayers of siltstones and sandstones. They are characterized by a gray, greenish-gray color; in the upper part there are layers of variegated and, in places, red-colored clays.

The clays are gray, greenish-gray, at the tops of the section – brownish-brown, silty, dense, finely exhumed, with rare charred remains of vegetation, with horizontal layering. At the top of the section, iron hydroxides are widely developed.

Siltstones are greenish-gray, clayey and sandy, dense, strong.

Sandstones are greenish-gray, fine- and fine-grained, very often silty, dense, strong, massive, quartz-feldspathic with inclusions of rare glauconite grains.

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The Kimmeridgian-Tithonian deposits (J3 km-tit) overlie the Callovian-Oxfordian deposits with erosion. They are represented by gray, light gray, sandy, fine-crystalline, and massive limestones. The rocks are enriched with inclusions of micro- and macrofauna, Myophorella of. Coralina Orb., Mactromyasp. indexogira(Amphedouta)cf. BruntrunataTurn., determined by S.Kh. Chepikova in the section of the Assakeaudan reference well among similar limestones.

Within the study area, the thickness of the Upper Jurassic deposits varies from 293 m (borehole No. 1 Kossor) to 331 m (No. 1, 2 V. Assakeaudan).

Conclusion. The Lower Jurassic sequence is composed of interbedded terrigenous rocks (sandstones, mudstones, siltstones, gravelites), while a clearer differentiation of sediments and the presence of pure differences are observed in comparison with the overlying Upper and Middle Jurassic deposits, which is reflected by the presence in the section of thick up to 1149 (Karaaudan) m and more layers of sandstones and clays.

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