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The Upper Jurassic Oil-Bearing Horizon Of The Southern Regions Of The Yamal Peninsula.

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ABSTRACT

The performed analysis of geological and geophysical materials allows us to conclude that there is a wide area development of Upper Jurassic sandy-silty rocks in the southern regions of the Yamalpeninsula. Inclusion of the Nurminskaya suite in the correlation scheme of 2003 completely corresponds to the actual material, but its distribution is shown rather arbitrarily. The authors have significantly refined the area of its development. The increasing thicknesses of permeable rock differences westward make it possible to predict the development of a sandy horizon of late Jurassic age on the shelf of the Kara Sea. Oil manifestations in the sandstones of the Nurminskaya suite allow it to be identified as one of the promising oil prospecting objects.
Keywords: Yamalpeninsula, Nurminskaya suite, oil and gas potential, formation, horizon, correlation scheme, Upper Jurassic.

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INTRODUCTION

The article substantiates the geological structure of the Upper Jurassic deposits in the southern regions of the Yamalpeninsula. The results of the work made it possible to refine the area development and structure of the Nurminskaya suite and draw a conclusion about the prospects of its oil and gas potential.

OBJECT AND METHODS OF RESEARCH

The compilation of geological and geophysical data (coring, logging, processing and interpretation of seismic materials) allowed us to clarify the geological structure of the Upper Jurassic of the southern regions of the Yamalpeninsula and assess the prospects of oil and gas potential.

RESEARCH RESULTS

In the first half of the 20th century the territory of the Yamal peninsula was studied in the areas adjacent to the Subpolar Urals. This is due to the small depths of occurrence of sedimentary formations, and sometimes to outcrops on the surface.About 100 core wells were drilled here in the directions Salekhard - Poluy, Salekhard - Yar-Sale, Shchuchya - Saletta and others.The Upper Jurassic formations were discovered in the Kunovatskaya (well No. 20), Puykovskaya (wells No. 29, 31), Yarsalinskaya (well No. 20), Syunai-Salinskaya (wells No. 41, 42, 43.45), Verkhorechenskaya (well No. 2), Mossy (well No. 1), Medvedevskaya (wells No. 21, 24), Pugor-Pugolskaya (well No. 23), Shuginskaya (wells No. 82, 83), Kutopyeganskaya (well No. 1) and a number of other areas.In the sections of some of the above wells marine clayey strata with interlayers of glauconite sandstones are described. The faunistic definitions unambiguously confirm the Late Jurassic formation of the sediments under consideration. Even at an early stage of research on the Jurassic horizons of Western Siberia, a regularity was established, expressed in the claying of Upper Jurassic formations in the direction from east to west. The appearance of sandy-silty rocks in the Upper Jurassic in the western regions contradicted the prevailing opinion about the character of the change in the section. Therefore, most researchers referred these sandy-silty rocks to the Middle Jurassic, and age determinations of the Upper Jurassic were often considered the result of a mistake in referencing and studying the rock material.

At the end of the last century, drilling operations were moved to the northern regions of the Yamal peninsula. Wells were drilled at the Novoportovskoye, Neytinskoye, Nurminskoye and Middle-Yamalskoye uplifts, where the sandy-silty interlayers have a sharply subordinate significance, so the question of developing sand formations in the Upper Jurassic of the western regions was not raised, and rock material was selected in very small quantities. For example, the Bazhenov suite is characterized by coring only in the sections of the wells No. 6 at the Nurminskoye (int. 2901 - 2906m) and 53 at the Kruzenshternskoye (int. 3470-3480m) deposits, 51 at the Severo-Mantoiskoye (int.2246-2 2265m) uplift, as well as in a number of wells in the West Yarotinskaya area. In all sections, these are black bituminous siltstones, platy with casts of fauna and ichthyo detritus.Laboratory studies of the core showed that the lithofacies characteristics of the Volga superstage formation on the Yamal peninsula have the same values as in other parts of the province. Therefore, in the absence of rock material in the borehole, the Bazhenov suite can be differentiated in a section by a logging complex with mandatory binding by radioactive and induction logs. The former shows bituminous siltstone-like clays by anomalously high values, and the latter - by anomalously low. Sedimentary formations of the Upper Jurassic have a rather complex structure, therefore, when studying them, a whole series of questions arise, the resolution of which is possible only under conditions of a detailed study of the conditions for the formation of the sedimentary cover, not only at the end of the Jurassic but also at the beginning of the Early Cretaceous. First of all, this is due to the identified stratigraphic disagreement on the border of the Jurassic and Cretaceous. On the territory of Western Siberia, the erosion of various parts of the Upper Jurassic sedimentary formations has been described by many researchers.

Stock and published materials, data from seismic profiles and core wells, allow us to conclude that the Upper Jurassic deposits are completely or partially eroded in the northeastern regions adjacent to the Urals, Pai-Khoi and Shchuchinskiy offset[1,2].

At the Ust-Yurbeiskaya area, the sandy-silty material is contained in a 20-meter pack (int. 2153 - 2173m, well No. 30). Sufficiently interesting data were obtained at the Syunai-Salinskaya area (well No. 43),

where rock material from the Upper Jurassic was selected in the interval 1480-1500 m. It is represented by a light grey sandstone with a greenish shade, fine-grained, with clayey cement and thin interlayers of greenish-grey clays. There is a cluster of mollusk shell fragments, which is very characteristic of the sandstones of the Upper Jurassic. In the overlying formations (int. 1450 - 1456m, well No. 43), the Berriasian fauna was determined. At the Novoportovskaya area in the well No. 103 (int.2343-2352m), glauconite sandstones were selected, above which (int.2319-2329m) Kimmeridgian ammonite was determined.

The formation of sediments of the Upper Jurassic at the Rostovtsevskaya, Kamennomysskaya, Nurminskaya and Sredne-Yamalskaya structures occurred in identical lithologic-paleogeographic settings. They are composed mainly of clays and bituminous siltstones with interlayers of a sandy-silty material.

At the suggestion of N.Kh. Kulakhmetov, V.I. Kislukhin and P.Ya.Zininberg, sedimentary formations of the Upper Jurassic and Callovian in the south of the Yamal peninsula are differentiated in the rank of the suite, whose name - Nurminskaya - is given from the Nurma-Yakha River [3].

The stratotype of the Nurminskaya suite is adopted by well No. 8 of the Yuzhno-Nurminskaya area in the depth interval 3045 - 2985m. In the section of the Nurminskaya suit the oil-saturated core was recorded in the well No. 64 of the Rostovtsevskaya and well No.8 of the Yuzhno-Nurminskaya area, but hydrocarbon deposits of commercial significance have not yet been discovered. This is due to a very low level of study and, first of all, an insignificant percentage of the sampling of the rock material.

In the southeastern part of the described region, the thickness of the Upper Jurassic is greater, reaching 250 m. So, in well No. 3021 of the Voskhodnaya area, the Upper Jurassic (with Callovian) is differentiated in the interval 2425-2256 m. According to the core and logging results, a large amount of sandy-silty material is distinguished here in the Nurminskaya suite (int. 2340 - 2367 m, 2375 - 2394 m).

Sandy-silty deposits in faunistically characterized rocks of the Upper Jurassic were recorded on the eastern slope of the Novoportovskaya fold. At the Sredne-Yamalskaya uplift (well No. 15, int. 2965 - 2974m) in the Upper Jurassic, sandy-silty rocks are described, in the study of which the signs of hydrocarbons are noted.

The development of sandy-silty horizons in the Upper Jurassic formations is recorded by the core, or is confidently differentiated according to the logging data in the west of the Taz peninsula. In the section of well No. 50 of the Semakovskaya area in the Upper Jurassic, the total volume of sandstones does not exceed 9 m. In the western regions of the Yamburg uplift, a sandstone layer of 11 m thick (well No. 445) is recorded. At the Kharasaveyskoe deposit, sandy rocks according to the logging data are assumed to be in the sections of wells number: 47 (int. 3140-3164m), 42 (int. 3274-3276m), 45 (int. 3132-3200m) and 48 (int. 3150-3175m). The sandstones of the Sredne-Nurminskayasubsuite are also traced in the north-west of the Yamburgskoye (well No. 180,184,441) and Semakovskoe (well No. 54) deposits.

CONCLUSIONS

The above dataallow us to conclude that there is a wide area development of Upper Jurassic sandy-silty rocks in the southern regions of the Yamal Peninsula. Inclusion of the Nurminskaya suite in the correlation scheme of 2003 completely corresponds to the actual material, but its distribution is shown rather arbitrarily. The authors have significantly refined the area of its development (Fig.1). The increasing thicknesses of permeable rock differences westward make it possible to predict the development of a sandy horizon of late Jurassic age on the shelf of the Kara Sea. Oil manifestations in the sandstones of the Nurminskaya suite allow it to be viewed as one of the promising oil prospecting objects.

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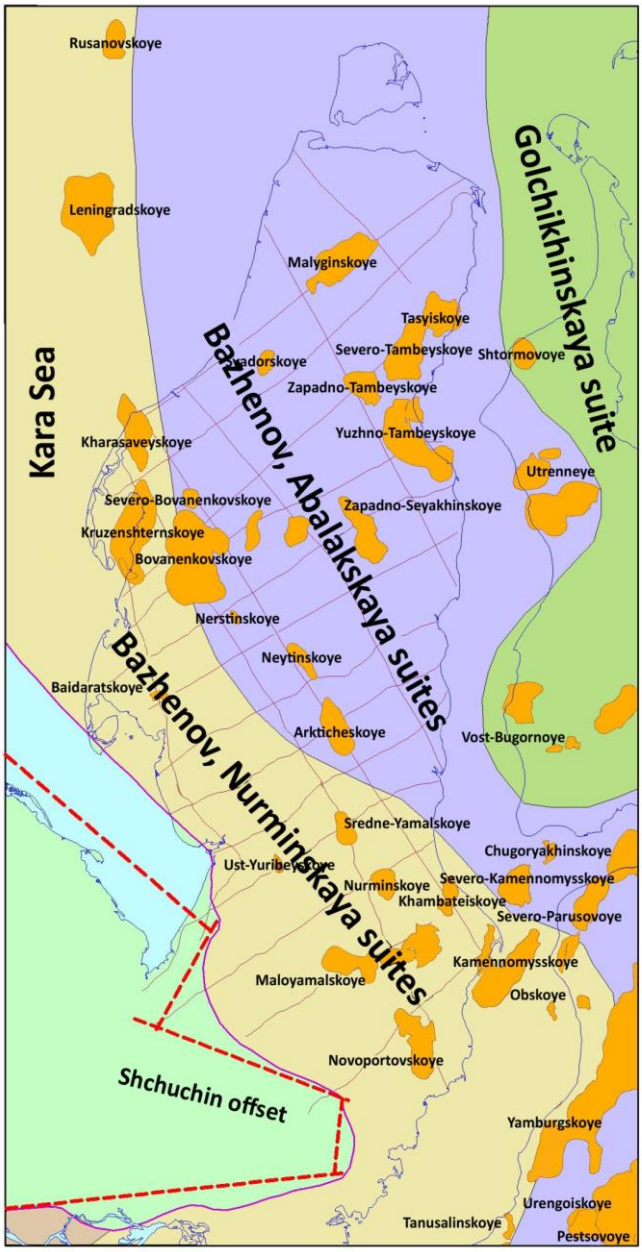

Fig 1: Zoning of the Upper Jurassic by section type (Yamalpeninsula).

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