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PREDICTION OF DEPOSIT OIL-BEARING CAPACITY OF THE TUTLEYM SERIES WITHIN THE KRASNOLENINSK ARC (WESTERN SIBERIA)

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The paper is devoted to the problem of mapping fractured and cavernous fractured reservoirs of the tutleym series within the Krasnoleninsk arc. It is shown that the most perspective deposits are those of the low-tytleym arc. The presence of relation between reservoir and acoustic properties of the rocks involved is stated. For reservoirs to be mapped the results of dynamic inversion of time sections are used.

Considered deposits have been allocated in a rank of the Deminskaya series by P.F. Lee in 1956, which later, in schemes of division into districts of Western Siberia, accepted at meeting in 1960 [1], has been renamed to Tytleym. Three types of a cut are allocated based on content degree of an organic substance in the given formations: Chuelsk, Krasnoleninsk and Tobolsk, each one of them is located in corresponding area [2]. Rocks have been formed in late Jurassic (Low-Tytleym subseries) and early Cretaceous (Upper-Tytleym subseries) times. The general capacity of the given deposits changes within the limits from 20 up to 40 m. Materials of lithologic and geochemical researches of the given deposits have underlied in the basis of some monographies, reviews and articles [3, 4, etc.], according to which the productive layers have been allocated in deposits, presented by siliceous and carbonate lithotypes**,** where secondary reservoirs are formed, fig. 1.

Oil-gas bearing ability within the limits of the Krasnoleninsk arc (Krasnoleninsk type of a cut) is proved on the Em-Egovskaya, Kamennaya, Lorbinskaya, Sosnovo-Mysskaya, Palyanovskaya areas. Oil debits change within the limits from 0,5...3 up to 100 t/day and more, that is caused by reservoirs non-uniform structure of fractured and fractured-cavernous types.

The upper fluidosupport is represented by, widespread on the Krasnoleninsk arc territory, clay deposits of the Frolovskaya series. Occurrence of oil deposits in considered deposits, first of all, is possible under condition of isolation from permeable differences in underlaying rocks of the Abalakskaya series and formations of the pre-Jurassic complex. Apparently, the variant of hydrodinamically connected deposits is also possible.

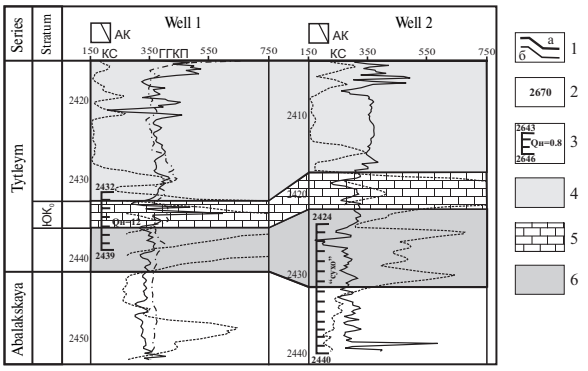

Fig. 1. *Lithologo-geophysical cuts of the Tytleym series: 1) series borders (a), layers (b); 2) cable depth, m; 3) an interval of approbation and test results in the punched stem: $Q_н$ – oil debit, m^3/day; deposits: 4) clay-siliceous bituminous, 5) carbonate, 6) kaolinite-clay*

The forecast of reservoirs development in deposits of the Tytleym series has been carried out on the basis of seismology work results and wells data.

High-speed properties of rocks, composing series divisions, have been studied by means of acoustic logging.

Layer speeds change as follows: the Upper-Tytleym subseries – V_{pl}=2130...2800 m/s (bituminous clay-siliceous formations); the upper part of the Low-Tytleym subseries – ≥4500 m/s (carbonate rocks); the bottom part – 2600...4200 m/s (kaolinite-clay and siliceous rocks).

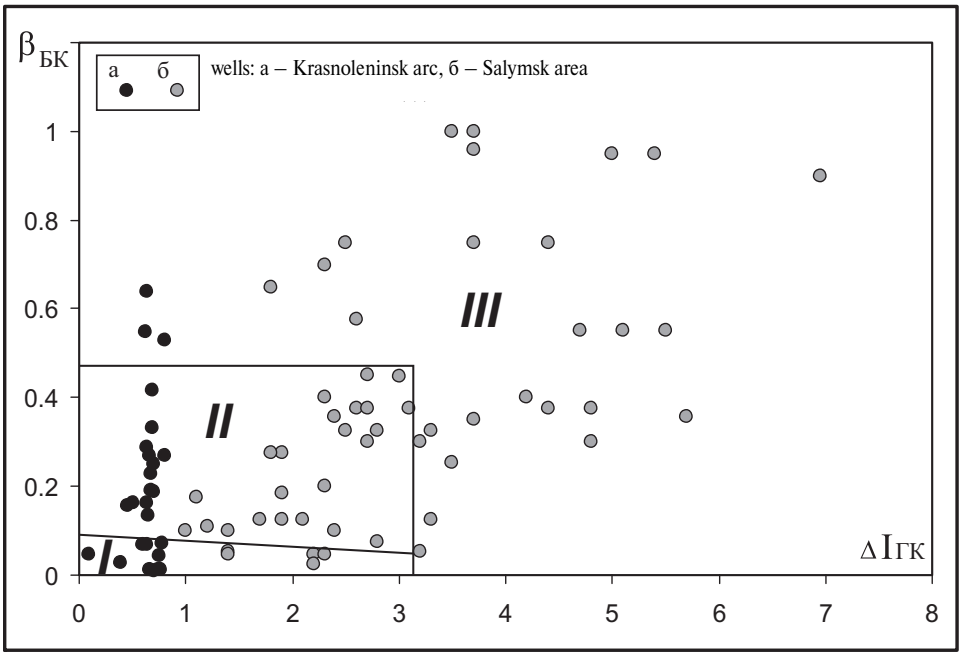

Fig. 2. *Comparison of relative parameters ΔI_{gl} and β_{ll} of bituminous rocks of the Krasnoleninsk arc (Upper-Tytleym subseries) and the Salymsk (Bazshenovsk series) deposits. Zones: I) impenetrable rocks, II) ambiguity, III) permeable rocks*

In connection with absence of representative sample on tests of the Upper-Tytleym subseries deposits, the analysis of the following relative parameters has been conducted: data of lateral logging in the studied layer and in the layer possessing the maximal resistance, situated in bedding of the Upper-Tytleym subseries (β_{ll}), and double differential parameter of gamut-logging (ΔI_{gl}) (i. e. gamut-logging indications of the investigated layer of bituminous rocks and basic layer of higher-deposited clays of the Frolovskaya series) [5]. At the next stage of studying, comparison of the obtained data to the results revealed at research of bituminous rocks of the Bazshenovskaya series of the Salymsk oil deposit has been done by the authors of work [6]. They have established that at increase of quantity of permeable layers the density of bituminous rocks decreases, – that is reflected in increase of ΔI_{gl} and increase of β_{ll}. starting from values $\Delta I_{gl} \geq 3$ reservoir's presence is marked [6], fig. 2.

Because the significant part of wells has opened cuts of the Upper-Tytleym subseries, characterized as impenetrable or unclear saturation, at present time of the research, apparently, these deposits are necessary to consider as low perspective object. This position will be coordinated with hydrodynamical researches – the maximal inflow of oil from these rocks makes 0,5 m^3/day.

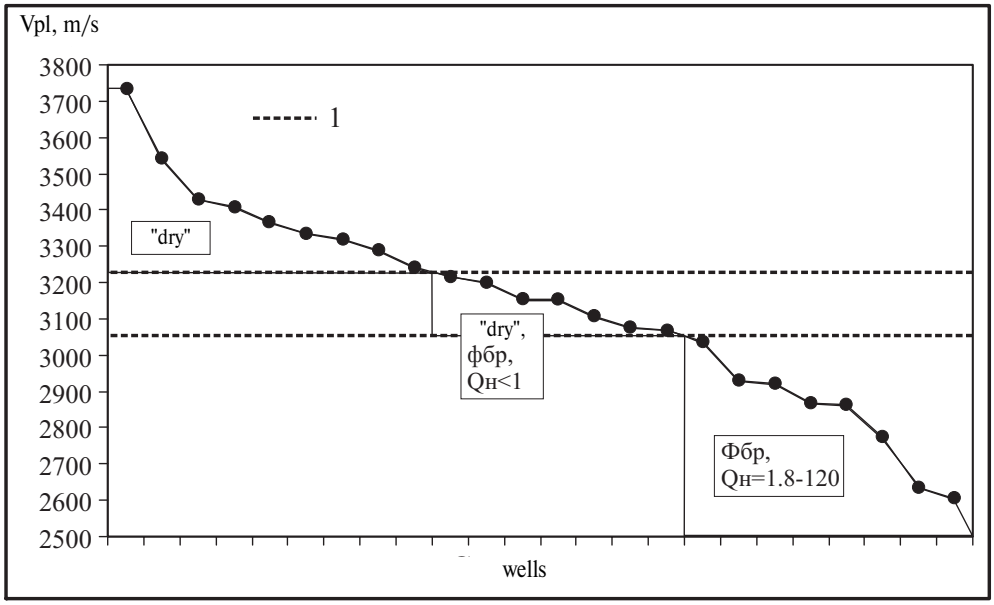

Fig. 3. *Comparison of test results of wells and layer speeds of the Low-Tytleym subseries deposit: 1 – conditional border of deposits section of the Low-Tytleym subseries on collector's properties depending on values of layer speeds*

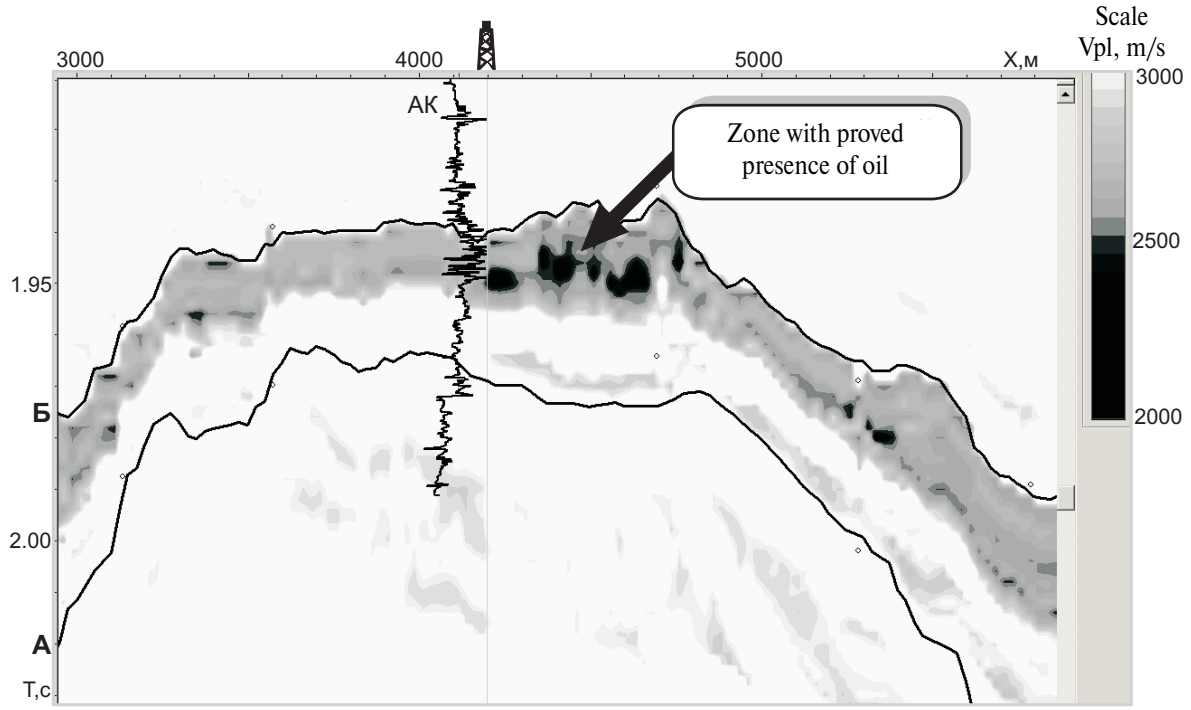

Fig. 4. *Fragment of speeds cut which is passing through a well, given an oil inflow*

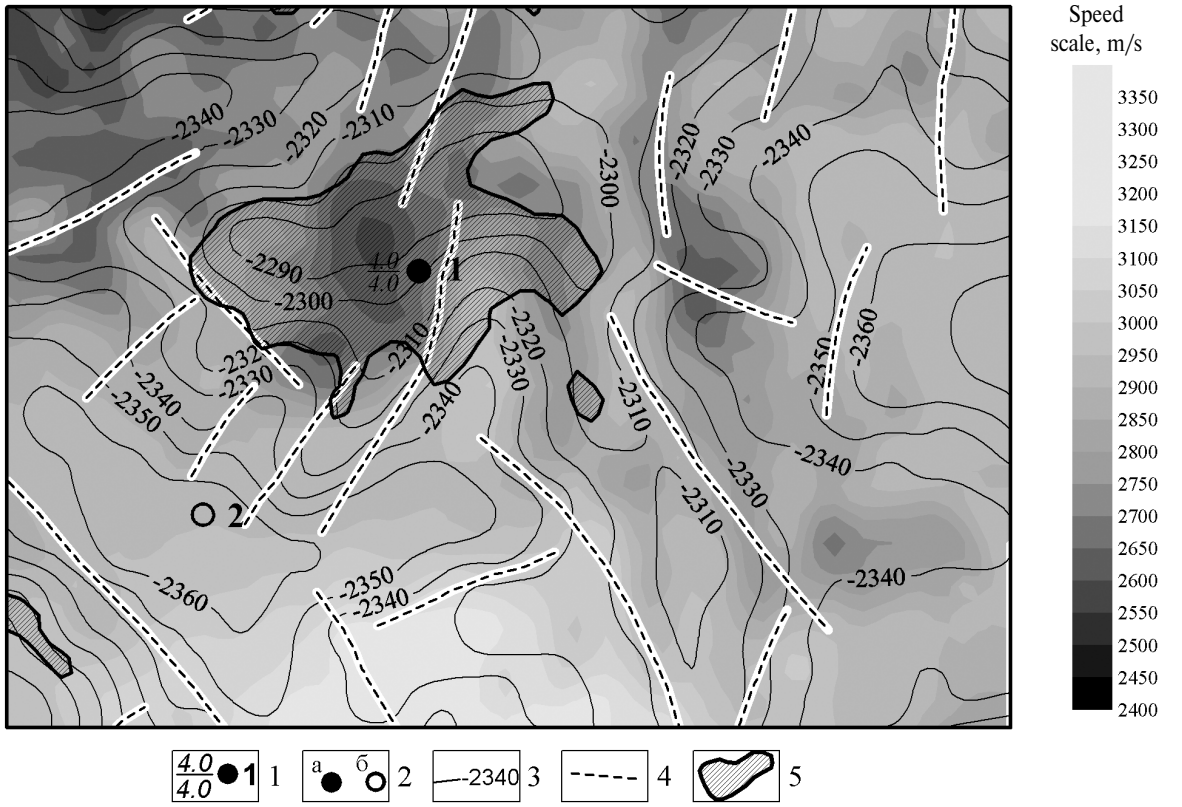

Fig. 5. *Seismogeological model of productive layer UK_0: 1) wells, on the right: number, on the left: effective capacity/effective capacity petrosaturated; 2) tests results: a – oil, b – «dry»; 3) isohypses of reflecting horizon B (Tytleym series bedding); 4) prospective brake infringements; 5) fissuring zones, corresponding to values of frequencies ≤22 Hz*

Comparison of acoustic characteristics and tests of wells shows that at presence of intervals having V_{pl}<3000 m/s, in the deposit of the Low-Tytleym subseries (layer UK_0) reservoir presence is possible, fig. 3.

Collector development zones are mapped on cuts of speeds received as a result of dynamic inversion in a software package [7, 8]. Anomalies of the lowered values correspond to reservoir sites, fig. 4.

Allocation of zones with prospective high fissuring has been done on the basis of the frequencies map calculated in an interval of Low-Tytleym subseries depositing.

In fig. 5 one example of comparison of speed map and frequencies within the limits of the revealed oil deposit in Low-Tytleym subseries deposit is shown (layer UK_0).

The complex of methodical techniques of reservoirs mapping can be applied within the limits of zones where investigated deposits have been formed in similar conditions of sedimentation, and, accordingly, characterized by close mineral structure and structurally-textural features which allows using attributes of seismic record.

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HYDROCHEMICAL DRAIN IN THE MIDDLE OB RIVER BASIN

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Results of studying the hydrochemical drain in Middle Ob basin (Western Siberia) and conditions of its formation are shown. Average values of ejection of the main ions, microelements, organic and biogenic substances with waters of the rivers: Ob, Tom, Chulym, Ket, Tym, Vasyugan, Parabel, Chaya for years 1997-2000 are established. It is shown, that the main part of hydrochemical drain is represented by the main ions and formed under the influence of mainly natural factors. Anthropogenous transformation of hydrochemical drain shows itself in the increase of hydrocarbons ejection, compounds of nitrogen and some other substances.

Introduction

In the process of the global water cycle, its continuous interaction with rocks and movement of huge quantity of the dissolved substances is happening. As a result, never ending transformation of the earth's crust is realized, and according to «the principle of indissoluble relation of alive and dead», proved by V.I. Vernadsky, and evolution of biosphere [1, 2]. Taking that into account, the hydrochemical drain plays exclusively important role in functioning of biogeocenosis of different levels and, in its turn, reflects the most essential changes in their structure and ecologo-geochemical condition of water objects. The given circumstance allows us to consider the problem of formation and changes of hydrochemical drain as the component of more general problems of interaction of the geospheres, natural and anthropogenous environment and climate transitions [3, 4].

Many known scientists at various times have been engaged in studying of this problem, including O.A. Alekin, V.P. Zverev, A. Lerman, A.M. Nikanorov, T. Paches, A.I. Perelman, E.V. Posochov, S.L. Schwarz, and others. Thanks to their works the scales of land denudation and mass-streams sizes of surface and underground hydrosphere at level of planet, continents, catchment basins of oceans and seas had been established. Much has been done in the way of studying of mechanisms of formation of chemical compound of natural waters of the top hydrodynamical zone. Nevertheless, many questions connected with necessity of studying the distribution of hydrochemical drain inside of large river basins and its formation in conditions of anthropogenous influence, till now remain unresolved. It essentially limits the opportunity of development of reliable long-term forecasts of quality change in natural waters and developments of optimal regional strategy of wildlife management, which