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GEODYNAMIC MODEL AND OIL AND GAS POTENTIAL OF THE NORTH-TORGAI BASIN

Abstract. In the course of history different groups of scientists have studied the tectonic structure and evolution and consistency of mineral deposits location on the exposed territory of the Kazakhstan and along the Eastern slope of the Urals. As a consequence, the Torgai depression, which divides the East and West Kazakhstan structures was admitted to be poorly investigated, therefore, this region remains a blank spot on the geodynamic reconstruction schemes over the Kazakhstan.

A geodynamic division into districts of the territory from the Urals in the West to the Kokshetau and Ulytau upheavals in the East was carried out in the article based on the analysis of the latest geological and geophysical materials. The East-Urals anticlinorium, the Denisov's shear zone, the Valeriyanov's synclinorium, the North-Torgai depression and the Kokshetau-Ulytau upheavals zone are emphasized.

The description of each tectonic zone is provided from the plate tectonics standpoint. The structure of the North-Torgai sedimentary Basin is described in more details and, taking into account its geodynamic evolution in the Devonian and Carbonic periods, the oil and gas potential of its central part as to the Devonian and Lower Carbonic sediments is highly appreciated.

Key words: a sedimentary Basin, a volcanic arc, an allochthon, oil and gas potential, a geodynamic model.

The northern Torgai is best known for its magnetite deposits such as Kacharsky, Sokolovo-Sarbaisky, the oolitic iron ore deposits of the Lisakovsk group, the Shaimerden polymetallic deposit, and also bauxite-bearing massive reserves of Denisov-Fedorov's and Valerianov's zones. All of these deposits are in the suture zone of the Ural fold system with the North Torgai depression, in the geodynamic order they were all arranged in the suture zone of the western edge of the Kazakhstan plate with the eastern line of the Urals Ocean of Paleozoic and the East-Urals microplate.

To the East of these acclaimed ore deposits the major part of the territory is covered with the Mesozoic-Cainozoic cover of a considerable thickness, which is actually denoted as the North Torgai depression in the literature. It adjoins in the East to the Kokshetau and Ulytau upheavals and in the North merges into the West Siberian syneclise rich by gas and oil reserves.

At the course of time a notion about " The Geology of East Kazakhstan" in the geological literature has been worked out since N.G. Kassin and R.A. Borukayev, whereby "The East Kazakhstan" was understood as the territory starting the Kokshetau-Ulytau zone the whole area of Kazakhstan, the total outcrops territory of Paleozoic and more ancient formations, since the exposed areas were exactly the exploration target in seeking the solid minerals. The numerous treatises of such luminaries of Kazakhstani geology as R.A. Borukayev, I.F. Nikitin, V.N. Lyubetsky, V.Y. Koshkin, A.V. Avdeyev and et al were dedicated to the Tectonics and paleo-geodynamic reconstructions of "The East Kazakhstan".

Another group of geologists headed by L.A. Yanshin, A.A. Abdullin and others studied the Urals-Mugodzhar zone.

Among the primary treatises "The tectonic map of the Kazakh SSR and adjacent territories of the Union republics" edited by V.F. Bespalov, G.V. Garkovets, V.K. Yeremin et al, (1971) and "The tectonic map of the Paleozoic foldings region of Kazakhstan and adjacent territories (edited by A.A. Abdullin and

G.V. Zaitsev, (1976) may be designated in which the probable correlations of the largest structures along both sides of the North Torgai depression are demonstrated.

In the landmark collective treatise "The Deep structure and the mineral resources of Kazakhstan" (Alma-Ata, 2002), "The Torgai-Syrdaryan depression divides the structures of the East and West Kazakhstan is specified. The basement structure of the depression has been relatively poorly studied; therefore, this region mainly remains a blank spot in the schemes of geodynamic reconstruction over the Kazakhstan" (p. 188).

Field investigations of various mineral resources, including oil, were carried out at the exposed area of the Urals fold system in the East, and within the Kokshetau and Ulytau upheavals in the West.

The direct evidences of oil availability on the Kostanai (Borovoi) anticlinal zone at the western flank of the North-Torgai depression have been known since 1936. The attempts to find oil deposits were undertaken several times. Explorations of oil and gas drilling the small wells up to 1,500 m were carried out on a relatively regular basis in the Shcherbakov, Novonezhinsk, Lesnoi and Koskolski areas by the North Kazakhstan Territorial Geological Department in 1953-1973. The numerous indications of dispersed oil and bitumen in the Carbonic period sediments, however, showed no significant accumulations. A weak influx of heavy tarry oil was just obtained in the 119 well, and managed to gather 1.5 tons volume.

In 2012-2017 the "Energy Resources" company have carried out excessive explorations and managed to receive the oil influx in the H-I well on the Novonezhinsk area and fulfilled the seismic surveys by 2D CDP method not only in the detection area with the determined Shokai, Shakhmardan, Sagadat fault traps, but also regional lines that proved failure to deploy of the Devonian and Carbonic sediments between the Kostanai anticlinal zone and the Kokshetau massif. The same company has carried out the seismic investigations in the central part of the North-Torgai depression that allowed identifying the Devonian and Low Carbonic period ledges.

The new seismic materials along the central submerged part of the North-Torgai depression, indicating the failure to deploy of the Devonian and Carbonic sediments of more than 4,000 m thickness, unlike the Valeriyanov's zone, where they are crushed into folds, destroyed by numerous faults and broken by intrusions, are absolutely not correspond with the Hercynides development notions on this territory from the standpoint of the geosynclinal hypothesis. The fact of the North-Torgai area was referred to the Hercynides denoted on the each tectonic map published during the Soviet period and in the subsequent editions of individual scientists have retarded the oil explorations to a great extent, scientifically grounded assessment of its prospects and, as a consequence, the attraction of investors to the exploration of oil deposits.

The entire North-Torgai territory on the maps of oil and gas bearing regions of the USSR (A.N. Shardanov et al. 1983, G.Kh. Dikenshtein et al. 1984) was classified as a land with unclear prospects or of no prospects up to the beginning of the 21st century. The Central-Torgai potential oil and gas bearing area was emphasized in the treatise " The Deep Structure and the Mineral Resources of the Kazakhstan, Oil and Gas", Volume III edited by S.Z. Daukeev, B.S.Uzhkenov, A.A. Abdulin and others (2002) and in " The Intergrated research of sedimentary Basins of the Republic of Kazakhstan. The North-Torgai Basin" edited by O.A. Aksholakov and A.B. Bigarayev (2011). A scientific substantiation of oil and gas potential of the Paleozoic sediments, other than a brief description of the Paleozoic as regards the Kostanai reference profile and the individual non-deep wells is unfortunately not provided in them.

The abovementioned treatises about oil and gas geological division into districts has modeled on the study of geosynclines and platforms, and the main criteria were the stratigraphic range of the sedimentary deposits and the structural and morphological traits of the cover structure. The formation (genesis) of the Basin itself and its geodynamic conditions of evolution, which predetermined the conditions and the rate of sedimentation, probable variations in the thermal control and the influence of tectonic processes occurring in the Urals fold system, most significantly in the Valerianov's volcanic zone appearing the primary factors were not taken into account.

Such kind of failings are mostly considered and eliminated at the process of study of the Basin from the standpoint of plate tectonics theory.

The igneous and sedimentary rocks and the new seismic materials association analysis on the territory between the Urals fold system and the Kokshetau ancient massif affords to identify a number of geodynamic zones that adequately explain the regularities of as solid minerals deposition of various

mineralization and the plentiful oil occurrences and provide a scientific basis for the oil and gas prospects assessment of the North-Torgai Basin. In terms of zoning of the considered territory summarizing the numerous publications on the tectonics it is expedient to single out: the East-Urals zone, terminated in the East by the Zhetigarin's regional fault; the Denisov's shear zone to the Livanov's fault; Valeryanov's zone, which forms the northern part of the regional volcanic arc and gradually turns into the Kostanai anticlinal zone, terminated from the East by the Central-Torgai fault. This anticlinal zone forms the western flank of the North-Torgai Basin; the main prospective target of new oil and gas deposits is limited in the East by the ancient Kokshetau and Ulytau upheavals (figure 1 and 2).

The East-Urals zone is represented by an allochthonous plate terminated in the East by the Zhetigarin's regional fault, well-mapped by the outcrops of the ancient strongly transformed and greatly dislocated rocks of Riphean, Vendian and Lower Paleozoic. This fault zone can be observed for several hundred kilometers and consists of several plots (?) echelon like interlocking. The allochthonous plate proceeded along this plate, which now forms the East-Urals mega-anticlinorium, in the late Paleozoic at the closing stage of the eastern line of the Urals Paleogene due to the Kazakhstani continent convergence and clashes with the East-Urals microcontinent.

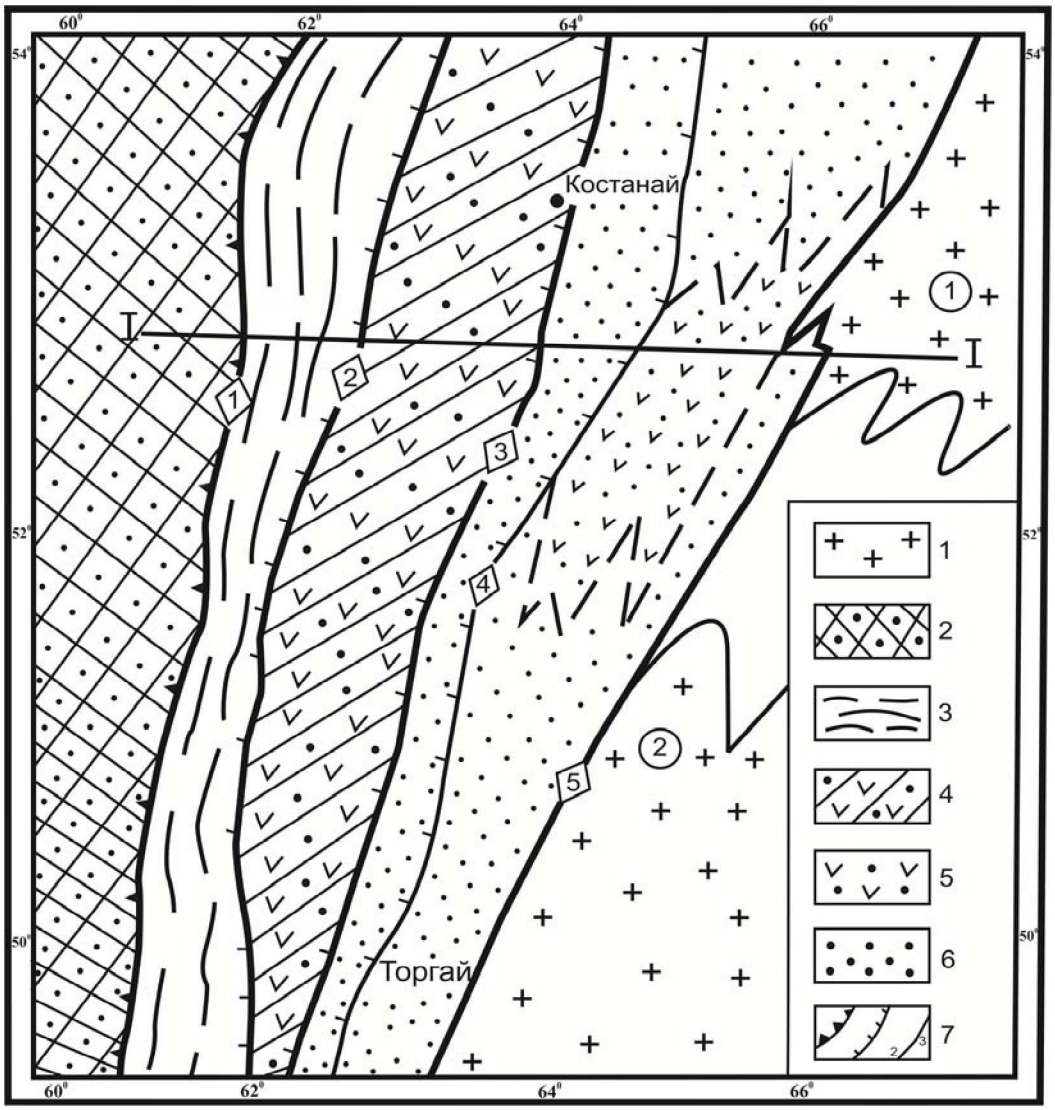

Figure 1 – The geodynamic model of the North-Torgai.

Basin structure: 1 – ancient Precambrian upheavals: 1 – Kokshetau and 2 – Ulytau; 2 – East-Urals megantiklinorium; 3 – Denisov's shear zone; 4 – Valerianov's synclinorium; 5 – Kushmurun's graben; 6 – North-Torgai depression; 7 – thrusts (1), faults (2) and regional faults (3): 1 – Zhetygara, 2 – Livanov, 3 – Apanov, 4 – Central-Torgai and 5 – Amangeldy.

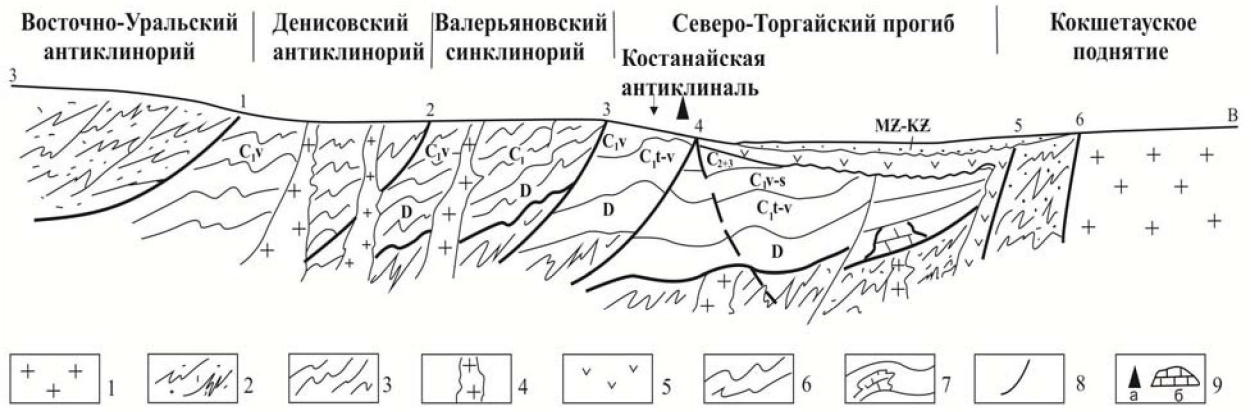

Figure 2 – Geological profile along the Ural-Kokshetau line:
1 – ancient massifs; 2 – allochthonous plate; 3 – Caledonian base; 4 – intrusions; 5 – Triassic traps; 6 – Devonian-Carbon age reefs; 7 – Mezozoic-Cainozoic cover; 8 – faults; 9 – Oil field of Novonezhinsk (a) and Ybraikhan Devonian reef (b).

The Valerianov's zone between the Zhetygara and Apanov regional faults in terms for the conventional geodynamic principle of division into districts can be considered as a part of a regional volcanic arc in the West of the Kazakhstani lithospheric paleo-plate which was formed due to the subduction of the ocean floor of the Urals Paleogene eastern line under the Kazakhstani plate.

The Valerianov's zone is a part of the regional volcanic belt is known in the literature as the Valerianov-Beltau-Kuraminsky, with a total length of more than 2,000 km, more than 1,100 km in the territory of Kazakhstan in particular. The belt formation is associated with the island-arc process in the western pericratonic margin of the Kazakhstani lithospheric plate. The main Torgai iron ore region and the Western Torgai bauxite bearing region are associated with the Valerianov's zone. The metallogenetic state of the Valerianov's zone is determined by the volcanogenic sedimentary formation of the Vize and the Serpukhov's Stage, which is represented by a terrigenous-carbonate-volcanogenic thickness, which is divided into three suites: the Sarbaian basalt-andesite ($C_{1,v}$), Sokolov's carbonate-volcanic ($C_{1,\ v2\text{-}3}$) and Kurzhunkul's Andesite ($C_{1,}$ v-s).

Similar to the Kuramin's zone in the Republic of Uzbekistan non-ferrous metals are predicted in the Valeryanov's zone: copper, lead, zinc, as well as gold. The Shaimerden zinc deposit in this zone is the first indication of the possibility to forecast the polymetallic salinity.

The sedimentary-volcanogenic formations of the Lower Carbonic Period, contorted into the structural highs of the north-south trend, complicated by discontinuous faults play the main role in the Valerianov's zone structure. They are represented by the sandstones, argillites and limestones and underlie without visible unconformity on the Famennian sediments.

The section explored in the region begins with the reddish continental sediments of the Devonian, carbon bearing thickness of the Famennian and the lower Tournaisian is above, which is overlapped by the carbonate-terrigenous thickness of the upper Tournaisian-Lower Vize. The section is completed with a huge volcanogenic-sedimentary thickness of an average Vize and the Namurian consisting of the limestones and reddish-grey color sandstones with tuffaceous material and basalt interlayers, spilites and andesite-basalts, which is the main ore-bearing suite the largest deposits of magnetite ore are confined to. The bituminous limestones were found in the Valerianov's suite at the Sarbaian deposit (figure 3).

The study of the samples from the numerous core wells and the outcrops has concluded in the content of the volcanic strata in the section decreases significantly with the distance from the Ural to the East, and the section is represented by terrigenous-carbonate rocks with the volcanic rocks inclusions and interbeds on the Kostanai (Borovoi) anticline.

The Valerianov's zone overall laminary thrust on the East is confined by the Apanov's regional fault, at the back of which the influence of tangential stresses, naturally directed from the Ural to the East is sharply faded.

Throughout the Devonian and the Early Carbonic periods the North-Torgai Basin was a passive margin of the Kazakhstani continent, facing the Urals Ocean. Starting with a late Vize, i.e. the collision of

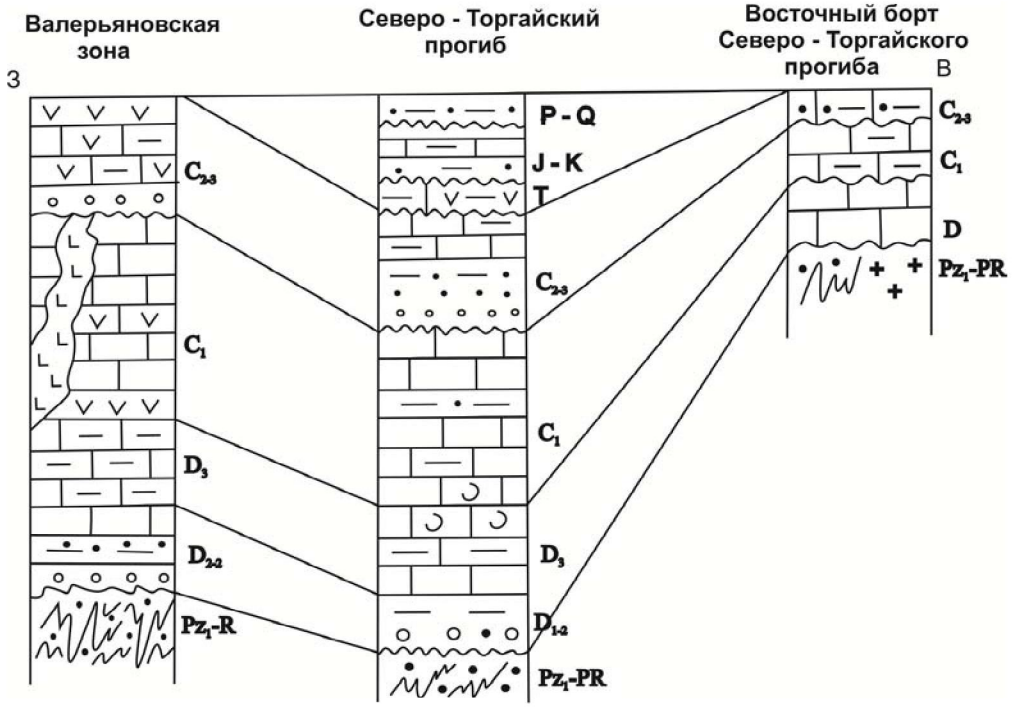

Figure 3 – Sections comparison

the Kazakhstani plate with the East-Urals micro-plate and with the East-European plate, the Valerianov's volcanic belt formed by andesites, andesite-basalts, dacites and diorites and granodiorites, breaking through them, originated behind the main island arcs of the Ural.

In the course of the Middle-Late Carbonic and Permian periods a significant shrinkage of the sea Basin size took place, foundation of the Late Paleozoic retro-arc deflections and the accumulation of terrigenous sediments with glomerations within their limits consisting of limestone pebbles and effusive of the Devonian and Lower Carbonic periods, which at the time were cropped out in the collisional orogens in the East-Urals anticlinorium, the Denisov's and Valerianov's zones of the Eastern Ural.

Following the geophysical explorations an abrupt difference of the North-Torgai depression from the Valerianov's zone is observed. The gravitational and magnetic fields have a high intensity and stretched in-line shape in the north-south trend within the Valerianov's zone. The North-Torgai depression differs by an inlaid weakly dissected shape of low intensity, both gravitational and magnetic fields (figure 4).

The structure of the North-Torgai Basin is well explored by seismology on the licensed territory of "Energy Resources" company. According to the regional latitudinal profiles, the performance of eight almost parallel reflecting horizons is evidenced by the lack of deployment of the Devonian and Carbonic formations of more than 4,000 m thickness (figure 4). Based on the geosynclines standpoint, the territory examined is within the Urals-Mongolian belt Hercynides, where the strong deployments of the Devonian and Carbonic formations are expected to be as in the Valerianov's zone. Recently accepted information confirms the accuracy of our approach to the study of the North-Torgai Basin structure from the standpoint of plate tectonics theory (3 and 4).

The reefs of the Devonian – Tournaisian age of 600-750m high as the Ybyraikhan reef have been identified on the western slope of the Aschiboy's upheaval in the central part of the Basin (figure 5). As previously mentioned, in the territory adjacent to the Kostanai anticline, several local upheavals such as Shokai, Shahmardan and Sagadat are mapped by seismology, which can serve as deformational traps for oil and gas in the Devonian and Lower Carbonic sediments (figure 5).

The Devonian deposits are cropped out on the western and eastern flanges and are uncapped by the wells in the central parts of the Torgai depression. They are represented by a sedimentary-effusive stratum consisting of the red-colored glomerations and sandstones interstratified with the persilicic effusive covers. The shale rocks, limestones and tuffites are found occasionally. The dark grey bituminous carstified limestones of the Givetian age of up to 1,300 m thickness were encountered. The Upper Devonian

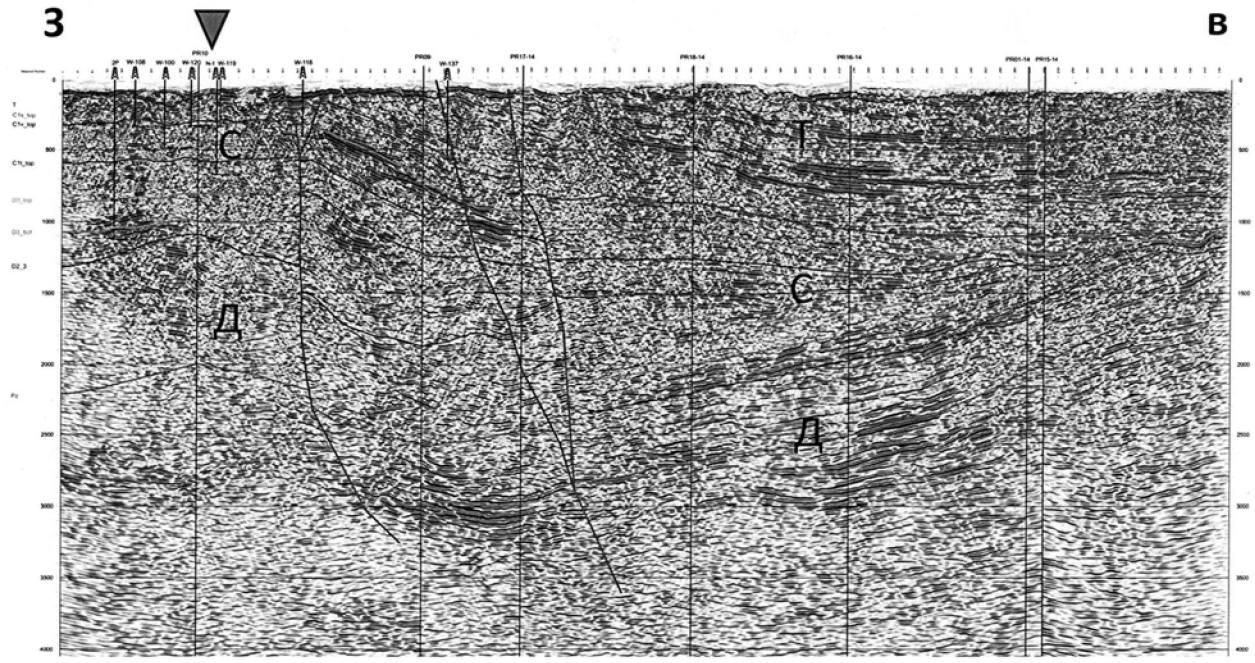

Figure 4 – Regional reflection time section through the North-Torgai Basin.
▼ Oil field of Novonezhinsk

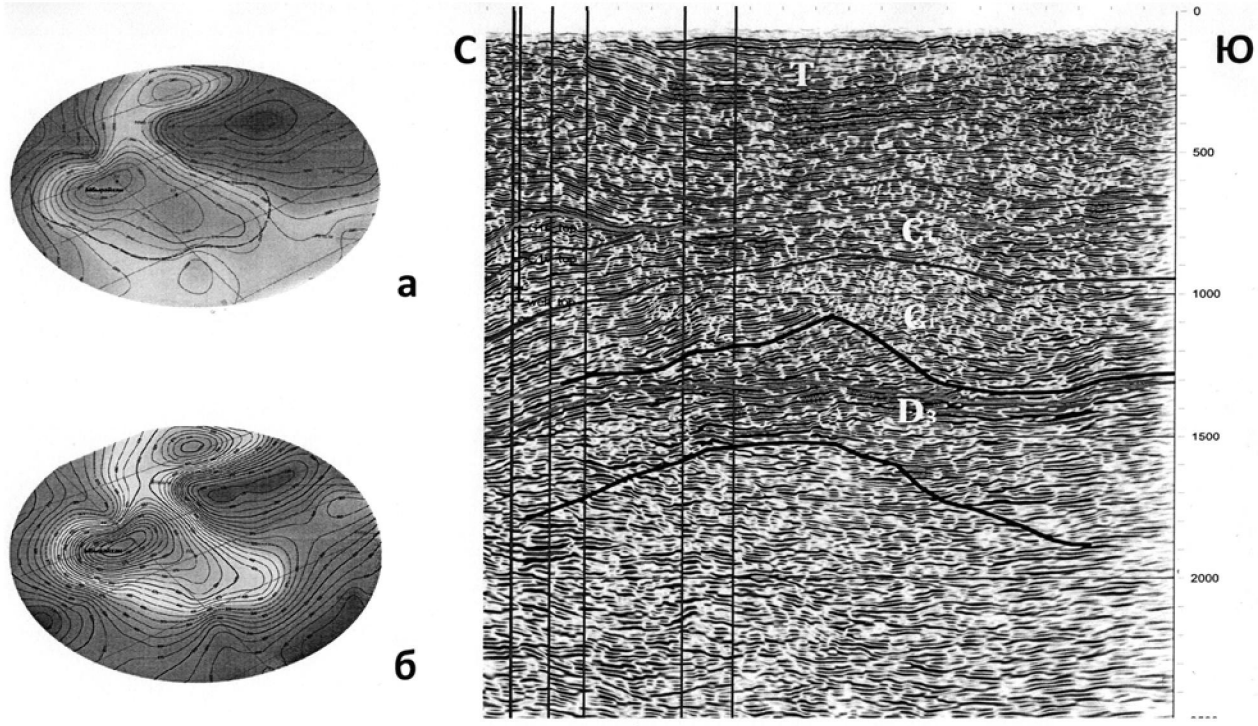

Figure 5 – Ybyraikhan reef: a – subsurface contour map along the reservoir top (reflecting R horizon), b – Isopach map of reef complex and c – depth section with reef structures

formations as part of the Frasnian and the Famennian stages are established everywhere. The Frasnian stage is represented by the carbonate and terrigenous rocks alternation with a total thickness of 500 m. The Famennian formations in the lower part of the section are folded by the red-colored, brown glomerations, coarse-grained sandstones and clay stones, with the effusion inter-layers now and then. In the upper part of the section the grey, organogenic, cavernous-fractured limestones are predominate, where the oil shows

were observed and oil influxes have been obtained in the Novonezhinsky and Shcherbakovsky stretches. Generally, the total thickness of the Devonian formations sharply increases towards the Ural, i.e. the former paleo-ocean, the content of the effusive rocks in the section increases in the same direction.

The Lower Carbonic formations are classified into three strata. The lower is of Lower Tournaisian age represented by terrigenous-carbonate sediments has a small distribution. The middle stratum of the Upper Tournaisian - Lower Vizean age in different structural-facies zones has a different composition and varies from the West to the East from the carbonate-terrigenous to terrigenous-carbonate and further to the carbonate. Numerous inclusions of liquid and inspissated oil are observed in the cracks and caverns of the limestones. The thickness of the middle strata reaches 1,000-1,200 m in the West and decreases in the East to 300-500 m.

The content of organic carbon varies from 0.1 to 2.97% per rock volume in the rocks of the Upper Devonian and the Lower Carbonic period, and, according to the results of a complex analysis, they belong to the category of oil and gas sources.

The Vize-Namur age formations are represented by the grey cavernous bituminous limestones. More recent terrigenous formations, conventionally related to the Upper Paleozoic, are distributed only in the West, mainly in the Kostanai zone and are represented by polymictic glomerations, sandstones and siltstones, effusives horizons are occasionally come across.

The main stage of tectonic deployments caused by compressive diastrophic movements is also assigned to this period, as a result of which the Denisov's zone thrust over the Valerianov's and the Valerianov's zones to Kostanai's and the systems of anticlinal folds arrangement overturned to the East and numerous faultings of the thrown up nature have occurred as a consequence. The geodynamic evolution of the Torgai depression, which was changed over time, has created depositional environment of the passive margin in the Devonian and the Early Carbonic period and then the retro-arc Basin in the Late Paleozoic.

In the central part of the North-Torgai depression the Lower Triassic formations of a considerable thickness in the Grabens unconformable embedded on the washed out surface of the Paleozoic.

The graben-synclines formations have occurred within the periods of volcanic activity alternating with the periods of aqueous sedimentation, judging by the frequent interstratifications of effusives with the sedimentary rocks. The thickness of the effusive rocks layers varies from 5-10 m to 100-160 m, and the sedimentary rocks, represented by the sandstones, conglomerates and clays, quite often enriched with the sapropelic substance, range from several meters to 60-100 m. This sedimentary-volcanogenic stratum is known as the Turinese series. The rude conglomerates layers are usually embedded in its foundation. The total thickness of the series is variable and exceeds 1,500 m in many Grabens. The central part of the North Torgai depression is covered with the low-power terrigenous sediments of the Mesozoic-Cainozoic period.

Simultaneous origin (the end of the Permian and the beginning of the Triassic) of Grabens and their confinement to the regional faults, which were the basaltic magma guides; a similar lithological composition of the filling sediments up to 3,000-4,000 m thick; the total north-south orientation is along the Ural throughout 600 km, at a line width of Grabens extension of 50-150 km allows to join them into a single East-Urals paleo-rift system. The genesis of rifts within the Torgai depression had a polycyclic nature. It took place in the Early Carbonic, Triassic and Jurassic periods. Regeneration of the rift structures is clearly observed to the South-East from Zharyk Graben formed in the Carbonic period, and Kush-Murunsky in the late Permian and Early-Middle Triassic to the Grabens of the near Ishim Group (the Late Triassic) and the Southern Torgai (Jurassic), is indissolubly connected with the activation change of the regional deep faults in the course of time. The Triassic genesis of rifts cycle was somewhat cut down in the development. The Graben of Kushmurun, perhaps, has passed the stage of deposition and, due to the change in the tectonic frameworks, specifically abrupt uplift it experienced no subsidence stage and above rift depression.

The Jurassic cycle embraced a vast territory, practically the entire central and southern part of the Torgai depression, at this the remarkable size Grabens of the Jurassic age were originated within the Grabens of the Early Carbonic and Triassic ages, that is, the second Grabens production in the same area has occurred.

The Zharyk graben-syncline is of 200 km length and 20-50 km width stretched from the southwest to the northeast, terminated by faults and executed by the Lower Carbonic sediments. The recent Kagansky

and Mukyrsky graben-synclines, executed by the Jurassic sediments, occur unconformable on the Lower-Carbonic stand out within its limits.

Kushmurun, Ashibulak and Kargalytau grabens are executed by the Tournaisian series, which contains basalts and dacites in a section. The small grabens of the following generation are developed within their limits, made by Jurassic coal-terrigenous sediments. In particular, the Jurassic grabens are distinguished within the limits of the Kushmurun graben-syncline: Yeginsay, Bylkyldak, Sevastopol, Chernigov, and others.

The Koktal graben-syncline executed by the Jurassic coal-bearing formations is located between the Zharyk Carbonic and the Kushmurun Triassic Age graben-synclines. Such graben-syncline Jurassic deposits have a wide distribution within the Torgai depression.

The grabens and graben-synclines of the Jurassic system are relatively well studied in the Southern Torguy due to the discovery of oil and gas fields with the considerable reserves - Kumkol, Aryskum and others. In the northern half of the Torgai depression, the grabens have a north-east, near north-south (Urals) orientation, and in the southern, mainly, north-west (Ulutau) orientation.

On the eastern flank of the North-Torgai Basin faintly deployed continental reddish-colored are established to embed abruptly unconformable on the ancient folded base. The volcanogenic-terrigenous deposits of the Devonian upwards interchange along the section by marine terrigenous-carbonate formations of the Famennian-Early Carbonic period. The red-colored terrigenous stratum of the Upper Paleozoic terminates the section.

The geodynamic evolution of the North-Torgai Basin in the Devonian and Carbonic periods favorably contributed accumulation of the marine and coastal-marine sediments within the passive continental margins of the Kazakhstani lithospheric plate on the eastern shore of the Ural paleo-ocean. The high organic carbon content in this age rocks and numerous oil manifestations and oil inflows indicate the presence of strata generating hydrocarbons in the section of the Basin, and the thermodynamic conditions caused by the presence of magmatic and effusive processes up to the early Triassic created a favorable state for the hydrocarbons generation as well.

The tectonic processes appeared due to the Urals fold system originating and the shear stresses caused by them towards the Northern Torgai resulted in the various structural traps and fractured reservoirs formation on the strata bends. The organogenic limestones in the reef structures are essential as a reservoir and sandstones and siltstones studied by the core holes in the Kostanai zone of anticlines. The wave fields of seismic sections, reflecting the alternation of terrigenous and carbonate rocks, give grounds for assuming a broad formation in the Basin of both reservoir rocks and cap-rocks.

In the Central part of the North-Torgai Basin, where the tectonic stress from the Ural was moderate, there are probably favorable conditions for the hydrocarbon concentrations accumulation and preservation. Special conditions for the formation and preservation of oil and gas accumulations existed in the reef structures of the Devonian and Carbonic period. Altogether it provides foundation for the optimistic potential of the North-Torgai Basin as regards new significant reserves in the oil and gas fields.

The large-scale seismic investigations to identify new traps that are attractive to the investors are required to carry out with the purpose of detailed study of the Devonian-Lower Carbonic sediments structure. Drilling of prospecting wells is necessary to initiate on the sites prepared for search drilling such as Ybyraikhan, Shokay, Shakhmardan, etc. Well-aimed geological explorations will hopefully lead to open not only one or two new oil and gas fields, but new oil and gas bearing and, in the future, oil and gas extraction area in the north of our Republic.

REFERENCES

[1] Borukayev R.A. Izbrannyye trudy (Selectas). Alma-Ata, 1971.

[2] Glubinnoye stroyeniye i mineral'nyye resursy Kazakhstana (Deep structure and the mineral resources of Kazakhstan). Almaty, 2002.

[3] Zholtayev G.Zh. Geodinamicheskiye modeli i perspektivy neftegazonosnosti osadochnykh basseynov Zapadnogo-Yuzhnogo Kazakhstana (Geodynamic models and oil and gas potential of the sedimentary basins of West-South Kazakhstan). Almaty, 1992.

[4] Zholtayev G.Zh., Nalibayev M.I. Devonskiye rify Severnogo Torgaia – vysokoperspektivnyye ob"yekty dlya poiskov novykh mestorozhdeniy nefti i gaza // Izvestiya NAN RK. Seriya geologiya i tekhnicheskiye nauki (The Devonian reefs of the Northern Torgai are highly promising objects for the new oil and gas fields searching. Izvestiya NAS RK, geology and engineering sciences edition). 2017. N 2. P. 5-11.

[5] Kirda N.P. Devonskiye i kamennougol'nyye otlozheniya Turgayskogo progiba i perspektivy ikh neftegazonosnosti (The Devonian and Carbonic periods deposits of the Turgai depression and their oil and gas potential), AN KazSSR edition. 1971.

[6] Tuayev N.P. Osnovnyye cherty geologicheskogo stroyeniya yugo-zapada Zapadno-Sibirskoy nizmennosti i Severo-Torgaiskogo proliva i perspektivy ikh neftegazonosnosti (The main features of the geological structure of the southwest of the West Siberian Lowland and the North-Torgai Strait and their oil and gas potential). TsNIGRI. 1957.

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СОЛТҮСТІК ТОРҒАЙ БАССЕЙІНІНІҢ ГЕОДИНАМИКАЛЫҚ МОДЕЛІ ЖӘНЕ МҰНАЙ МЕН ГАЗ ІЗДЕУДЕГІ БОЛАШАҒЫ

Аннотация. Пайдалы қазбаларды іздеу және кен орындарын зерттеу бағытында Қазақстан жерін екіге бөлу - Шығыс Қазақстан және Батыс Қазақстан деп - геология саласында тарихи қалыптасып қалған. Бұл екі аймақты бөлетін Солтүстік Торғай ойпатын зерттеуге көп көңіл бөлінбеген.

Жаңа геологиялық және геофизикалық деректерге сүйене отырып Орал тауларынан Көкшетау-Ұлытау аймағына дейін бірнеше геодинамикалық маңызы зор тектоникалық элементтер бөлінген. Олар Шығыс Орал антиклинарий, Денисов аймағы, Валерьянов синклинарий, Солтүстік Торғай ойпаты және Көкшетау-Ұлытау белестері.

Мақалады әр тектоникалық элементтердің толық сипаттамалары белгіленген. Геодинамикалық құрылысын зерттеу нәтижесінде Солтүстік Торғай ойпатында мұнай мен газ кен орындарын іздеуге болашақ бар деген тұжырым жасалған.

Түйін сөздер: шөгінді бассейн, вулкандық дуга, аллахтон, мұнайменгаздылық, геодинамикалық модель.

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ГЕОДИНАМИЧЕСКАЯ МОДЕЛЬ И ПЕРСПЕКТИВЫ НЕФТЕГАЗОНОСНОСТИ СЕВЕРО-ТОРГАЙСКОГО БАССЕЙНА

Аннотация. Исторически сложилось так, что изучением тектонического строения и эволюции и закономерностей размещения полезных ископаемых на обнаженной части Казахстана и по восточному склону Уральских гор занимались разные группы ученных. Вследствие этого признавали, что Торгайский прогиб, разделяющий структуры Восточного и Западного Казахстана, изучен слабо, поэтому на схемах геодинамических реконструкций по Казахстану этот регион остается белым пятном.

По результатам анализа новых геологических и геофизических материалов в статье произведено геодинамическое районирование территории от Уральских гор на западе до Кокшетауского и Улытауского поднятии на востоке. Выделены Восточно-Уральский антиклинорий, Денисовская зона смятия, Валерьяновский синклинорий, Северо-Торгайский прогиб и Кокшетауско-Улытауская зона поднятий.

Даны характеристики каждой тектонической зоны с позиции тектоники плит. Более подробно описано строение Северо-Торгайского осадочного бассейна и с учетом геодинамической его эволюции в девоне и карбоне дана высокая оценка перспектив нефтегазоносности центральной его части по девонским и нижнекарбоновым отложениям.

Ключевые слова: осадочный бассейн, вулканическая дуга, аллахтон, нефтегазоносность, геодинамическая модель.