MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

K.I. Satbayev Kazakh National Research Technical University

K. Turyssov Geology and Oil-Gas Business Institute

Department of Hydrogeology, Engineering and Petroleum Geology

Perizat Y.Bainiyazova

THESIS

Topic: **«Geological structure, oil and gas occurence and paleogeographic conditions for the formation of productive horizons in the North-Buzashinskaya oil and gas region»**

6B05201 – Geology and exploration of mineral deposits

Almaty 2023

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

K.I. Satbayev Kazakh National Research Technical University

K. Turyssov Geology and Oil-Gas Business Institute

Department of Hydrogeology, Engineering and Petroleum Geology

ALLOWED TO DEFENCE
Head of the Department of
Hydrogeology, engineering and petroleum geology,
PhD, Professor
T. A. Ensepbayev
«01» 06 2023 y.

THESIS

Topic: **« Geological structure, oil and gas occurence and paleogeographic conditions for the formation of productive horizons in the North-Buzashinskaya oil and gas region»»**

6B05201 – Geology and exploration of mineral deposits

Student: P.Y Bainiyazova

Reviewer
(Scientific degree, position)
Signature Full name

Research supervisor
PhD, senior- lecturer
(Science degree, position)
T.S. Jarassova
Signature *Ful name*

Almaty 2023

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

K.I. Satbayev Kazakh National Research Technical University

K. Turyssov Geology and Oil-Gas Business Institute

Department of Hydrogeology, Engineering and Petroleum Geology

ALLOWED TO DEFENCE
Head of the Department of
Hydrogeology, engineering and petroleum geology,
PhD, Professor
T. A. Ensepbayev
«07» 06 2023 y.

For thesis
TASK

Student: Perizat Y. Bainiyazova

Topic:«Geological structure, oil and gas occurence and paleogeographic conditions for the formation of productive horizons in the North-Buzashinskaya oil and gas region»

Approved by order *№408* of the Rector of the University *2022 year "23" November*

Completed Work Delivery Date *2023 year "30" May.*

Initial data for the thesis: results of sedimentological analysis of the core, attribute analysis of seismic data, seismic data on lithofacies and binding to geophysical well survey.

Summary of the Thesis: Analysis of geological structure, oil and gas potential and formation of productive horizons in paleogeographic conditions for field X at the North Buzachi oil and gas field.

List of issues considered in the thesis:

a) General information about the oil and gas basin

b) Geological department

c) Description of the productive horizons of the field

d) Formation of productive horizons in paleogeographic conditions

The schematic materials are listed in the 23 slide

Number of references: 11

To preparation of diploma work

TABLE

Title of sections, list of issues under consideration	Date of delivery to research supervisor and commissions	Remarks
General information about the oil and gas basin	15.02.2023	+ Done
Geological department.	18.03.2023	+ Done
Description of the productive horizons of the field	17.04.2023	+ Done
Formation of productive horizons in paleogeographic conditions	05.05.2023	+ Done

Signatures
of the commission of departments of thesis
and the controller of the norm for completed work

Title of list	**Commissions, name, patronymic, surname (degree, position)**	**Signature date**	**Signature**
General information about the oil and gas basin			
Geological department.			
Description of the productive horizons of the field			
Formation of productive horizons in paleogeographic conditions			
Norm control	Сомсабекова Н.Е.	22.05.23	

Research supervisor: T.S. Jarassova

Signature

The student who completed the task: P.Y Bainiyazova

Signature

Data "29" 11 2022 y.

АҢДАТПА

Дипломдық жұмыстың объектісі Солтүстік Бозашы мұнай-газ аймағынның солтүстік бөлігінде орналасқан Х кен орны болып табылады.

Дипломдық жұмыс аталып отырған аймақтың геологиялық құрылысын, мұнайгаздылығын және палеогеографиялық жағдайларда өнімді горизонттардың қалыптасуын талдауға арналған.

Дипломдық жұмыстың бірінші бөлімінде Солтүстік Бозащы мұнай газ бассейні жайында мағлұматтар, геологиялық сипаттамасы, литологиялық және стратиграфиялық сипаттамасы, тектоникасы және мұнайгаздылығы туралы жалпы мәліметтер берілген.

Екінші бөлімде кен орны туралы жалпы мәліметтер, геологиялық сипаттамасы, литологиялық және стратиграфиялық сипаттамасы, сонымен қатар кен орнының мұнайгаздылығы туралы мәліметтер берілген. Бұл көрсетілген тараулар кен орнының геологиялық бөлімін нақтылап зерттеуде маңызы зор.

Арнайы бөлім палеогеографиялық жағдайларда өнімді горизонттардың қалыптасуын зерттеуге арналған. Ауданның палеогеографиялық жағдайлары белгілі бірнеше ұңғымалардан өтетін 12 өнімді горизонтпен, ұңғыманың керн сипаттамасы бойынша седиментологиялық талдаумен, литофациялар бойынша сейсмикалық мәліметтермен, каротаж деректеріне кернді байланыстырумен, сейсмикалық деректер бойынша атрибуттық талдаумен анықталды. Осы мәліметтерді ала отырып, саздылықты анықтауға жасалған фациялық куб тұрғызылды.

Негізгі сөздер: Солтүстік-Бозашы, кен орын, тектоника, мұнайгаздылығы, өнімді горизонт, ұңғымаларды геофизикалық зерттеу, седиментологиялық талдау, атрибуттық талдау, керн, фация, саз.

Дипломдық жұмыс аңдатпадан, мазмұнынан, кіріспеден, үш бөлімнен, қорытындыдан, пайдаланылған әдебиеттер тізімінінен тұрады. Дипломдық жұмыста 21 сурет, 4 кесте және 36 беттен тұрады.

АННОТАЦИЯ

Объектом исследования дипломной работы является месторождение Х, расположенное в северной части Северо-Бозашинского нефтегазоносного района.

Дипломная работа предназначена для изучения геологического строения, нефтегазоносности и анализу формирования продуктивных горизонтов в палеогеографических условиях.

В первом разделе дипломной работы представлены общие сведения о нефтегазоносном бассейне, геологическое описание, литолого-стратиграфическая характеристика, тектоника и нефтегазоносность.

Во втором разделе представлены общие сведения о месторождении, геологическое описание, литолого-стратиграфическая характеристика, так же

нефтегазоносность месторождения. Эти главы имеют большое значение для уточнения и изучения геологической части месторождения.

Проектная часть посвящен изучению формирования продуктивных горизонтов в палеогеографических условиях. Палеогеографические условия района определены по 12 продуктивным горизонтам, проходящим через по определенным нескольким скважин, седиментологический анализ по описанию керна скважин, сейсмические данные по литофациям, привязка керна к данным ГИС, атрибутный анализ по сеймическим данным. Получив эти данные, был возведен фациальный куб глинистости.

Ключевые слова: Северо-Бузачи, месторождения, тектоника, нефтегазоносность, продуктивный горизонт, геофизические исследования скважин, седиментологический анализ, атрибутный анализ, керн, фация, куб глинистости.

Дипломная работа состоит из аннотации, содержания, введении, трех разделов, заключения, списка использованной литературы. Дипломная работа состоит 21 рисунок, 4 таблиц и 36 страниц.

ABSTRACT

The object of study of the thesis is the field X, located in the northern part of the North-Buzachi oil and gas region .

The thesis is intended to study the geological structure, oil and gas potential and analyze the formation of productive horizons in paleogeographic conditions.

The first section of the thesis presents general information about the oil and gas basin, geological description, lithological and stratigraphic characteristics, tectonics and oil and gas potential.

The second section presents general information about the field, geological description, lithological and stratigraphic characteristics, as well as the oil and gas potential of the field. These chapters are of great importance for clarifying and studying the geological part of the deposit.

The project part is devoted to the study of the formation of productive horizons in paleogeographic conditions. The paleogeographical conditions of the area were determined by 12 productive horizons passing through certain several wells, sedimentological analysis by well core description, seismic data by lithofacies, core tying to logging data, attribute analysis by seismic data. Having received these data, a facies clay cube was erected.

Key words: North-Buzachi, fields, tectonics, oil and gas potential, productive horizon, well logging, sedimentological analysis, attribute analysis, core, facies, clay cube.

The thesis consists of an annotation, content, introduction, three sections, conclusion, list of references. The thesis consists of 21 figures, 4 tables and 36 pages.

CONTENTS

INTRODUCTION

The North Buzachi region is one of the largest and most promising basins located in the western part of Kazakhstan, and in second place, the largest after the Precaspian oil and gas basin. The North Buzachi region is one of the leading oil and gas production regions in Kazakhstan. There are many oil and gas fields located here, which are being developed by various oil and gas companies. Oil and gas production is the main source of revenue and economic growth in the region.

Purpose of the thesis: geological structure, oil and gas potential of the area, as well as determination of paleogeographic conditions of the productive horizons of the field.

Tasks of thesis:

1. Conduct a sedimentological analysis of the core;
2. Conduct attribute analysis of seismic data;
3. Carry out lithofacies according to the description of the well core;
4. Analysis by horizons;
5. Carry out the results of the analysis according to geophysical well survey;
6. Conduct seismic data on lithofacies;
7. Building a facies model;

Personal contribution of the author: the thesis work, completed by the author, is an independent work during the internship.

In connection with the company's requirements for non-disclosure of confidential field name is missing.

1 Overview of the North Ustyurt Basin and North Buzachi oil and gas region

The North Ustyurt basin located in the northern part of the Ustyurt Plateau in Kazakhstan and Uzbekistan. The total area of the basin is approximately 250,000 km^2.

The North Buzachi oil and gas region, which is located in the north of the South Mangyshlak region, is territorially limited from the north and west by the Caspian Sea, from the east by the North Ustyurt oil and gas basin, from the south by mountain Mangyshlak. It is confined to a single complex tectonic element, is a anticline uplift of west-northeast strike, which is divided into structural Kalamkas and Karazhambas (Figure 1).

Figure 1 – Overview map of the North Ustyurt oil and gas basin

1.2 Tectonics

The southern boundary of the North Ustyurt oil and gas basin runs along the uplands of the Central Mangyshlak and Central Ustyurt. The central plateau of the

depression, which marks the Hercynian layer, is overlain by thin Jurassic Cretaceous deposits. Below these deposits, several wells penetrated partially metamorphosis clastic, carbonate and volcanic rocks of the Middle Paleozoic. Further continuation of the western border is unknown, but it is predicted that it may have been under the explosion of the young central Mangyshlak. And the eastern border of the basin is located on the shelf of Aral Lake, and this part was not drilled. (Figure 2).

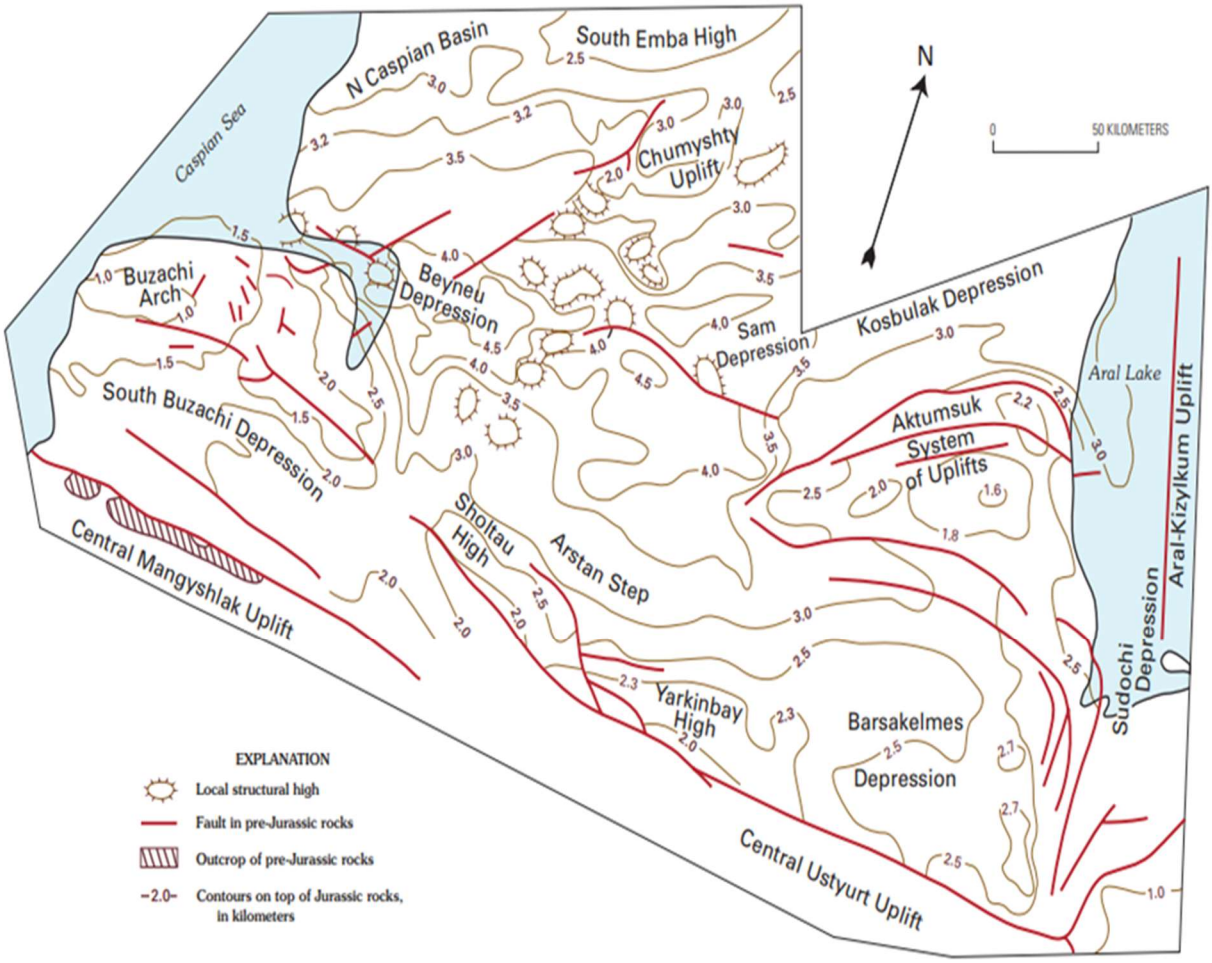


Figure 2 – Principal structural units of North Ustyurt basin (Ulmishek, 2001)

Based on seismic data, the basin is limited by the ascent of Aral-Kyzylkum to the north. According to this rise, the upper Paleozoic platform formations of the North Ustyurt basin are associated with modern deformed and metamorphosed rocks of the basement of the East Aral basin, and the Jurassic and small formations continuously contact between the basins. The southern and central uprisings give a relatively high appearance.

The surface of Jurassic rocks in these zones gradually occupies a depth of 2-2.5 km in the north to a depth of 3-3.5 km to the south, and the upper zones of the Jurassic period from 4 to 4.5 km. Further, the Beineu, Sam and Kosbulak depressions are at a depth of 5 km and even deeper.

1.3 Stratigraphy

Based on the results of drilling data, it was found that Paleozoic sediments, marine sediments, are the main rocks for the Upper Devonian basin, Middle Coal and Lower Permian of the North Ustyurt basin. They are represented by dolomites, tuffs, siltstones and fine-grained sandstones. In addition, other rocks combine in the alluvial environment with the Upper Triassic and Lower Jurassic systems. These are sandstones, siltstones and mudstones. As shown in the stratigraphy, oil exploration is promising due to sediments and sedimentary environment (Figure 3).

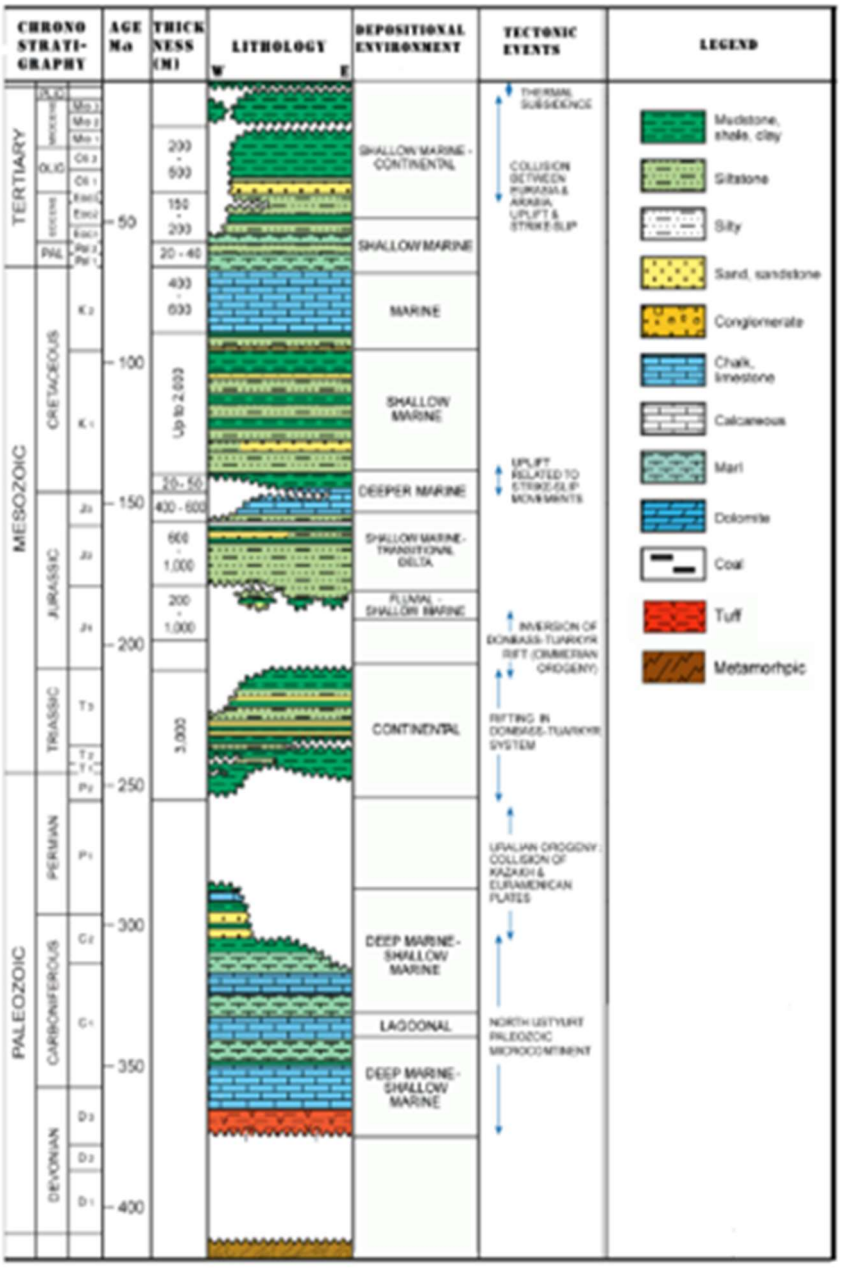


Figure 3 – Stratigraphy and lithology of North Ustuyrt oil and gas basin

In the Buzachi Peninsula, these rocks include marine carbonates and fragments from the Upper Devonian, Carboniferous and Lower Permian. Red and

spotted clastic rocks of the Upper Permian-Middle Triassic overlap various older layers. Upper Triassic dark gray carbonaceous shales are found only in the South Buzachi Depression. There are no Lower Jurassic rocks, and Middle Jurassic continental, carbonaceous, clastic rocks are inconsistently deposited on the eroded surface of Triassic strata.

1.4 Oil and gas potential

Exploration on the total oil system (TOS) of the North Ustyurt Oil and Gas Basin began in 1963. The following year, several gas fields were discovered in the northern part of the basin. Since the late 1960s, gas production began at some fields**.**

All hydrocarbons included in the (TOS) are located in three areas. The total oil-bearing system (TOS) includes three oil fields in the western part of the Jurassic reservoir system, one oil field in the eastern part and several gas fields at a depth of more than 3000 m. In general, the gas fields in the northern part of the oil system are relatively large. In addition, the gas fields are dry and located on Eocene sandstones at a depth of several hundred meters. Their reserves are about 1 trillion cubic feet. Hydrocarbon components of the gas have very small amounts of CH_4 and C_2H_6 without heavy hydrocarbon gases. The total oil system is light, sweet (0.2-0.3 percent), paraffinic (3-5 %).

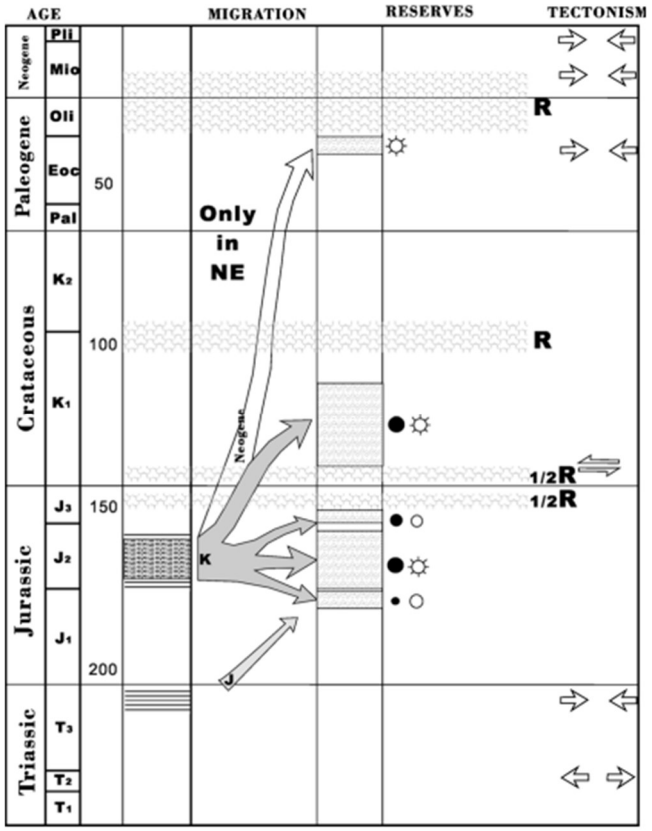


Figure 4 – Schematic diagram of the petroleum system of the North Ustuyrt Basin

North Ustyurt contains a variety of geological structures, such as fold belts, platforms, and faults, which can serve as traps to contain oil and gas. With suitable traps and permeable rocks, migration can occur along these structures.

The diagram above shows the distribution of oil and gas migration in the Jurassic system. Migration also spread in the Middle Jurassic and Lower Cretaceous. (Figure 4).

The productive zones of the North Buzachi arch consist of poorly cemented sandstones and siltstones with a porosity of 20 to 34% and a permeability of 50 to 3500 microns. The thickness of the floors reaches up to 20 m. The Jurassic oil complex consists of uneven, mixed sand-clay and clay rocks. The basin lies in weakly cemented sandy, clayey and sandy layers up to 25 m thick.

2 Geological structure

2.1 Geological description

The multilayer oil and gas field X, located in the northern part of the Buzachi Peninsula, is one of the largest fields in the Buzachi region of Western Kazakhstan. The history of the development and formation of the deposit is connected with the history of the geological development of the North Buzachi region. Opened in 1976. Exploratory drilling of deposits started in 1976. Development began in 1979. The deposits are represented by terrigenous Jurassic and Lower Cretaceous deposits. The deposits are located at a depth of 0.5-1.1 km.

The X field is located in the Mangistau region of the Republic of Kazakhstan, approximately 418 kilometers north-northeast of Aktau (Figure 5).

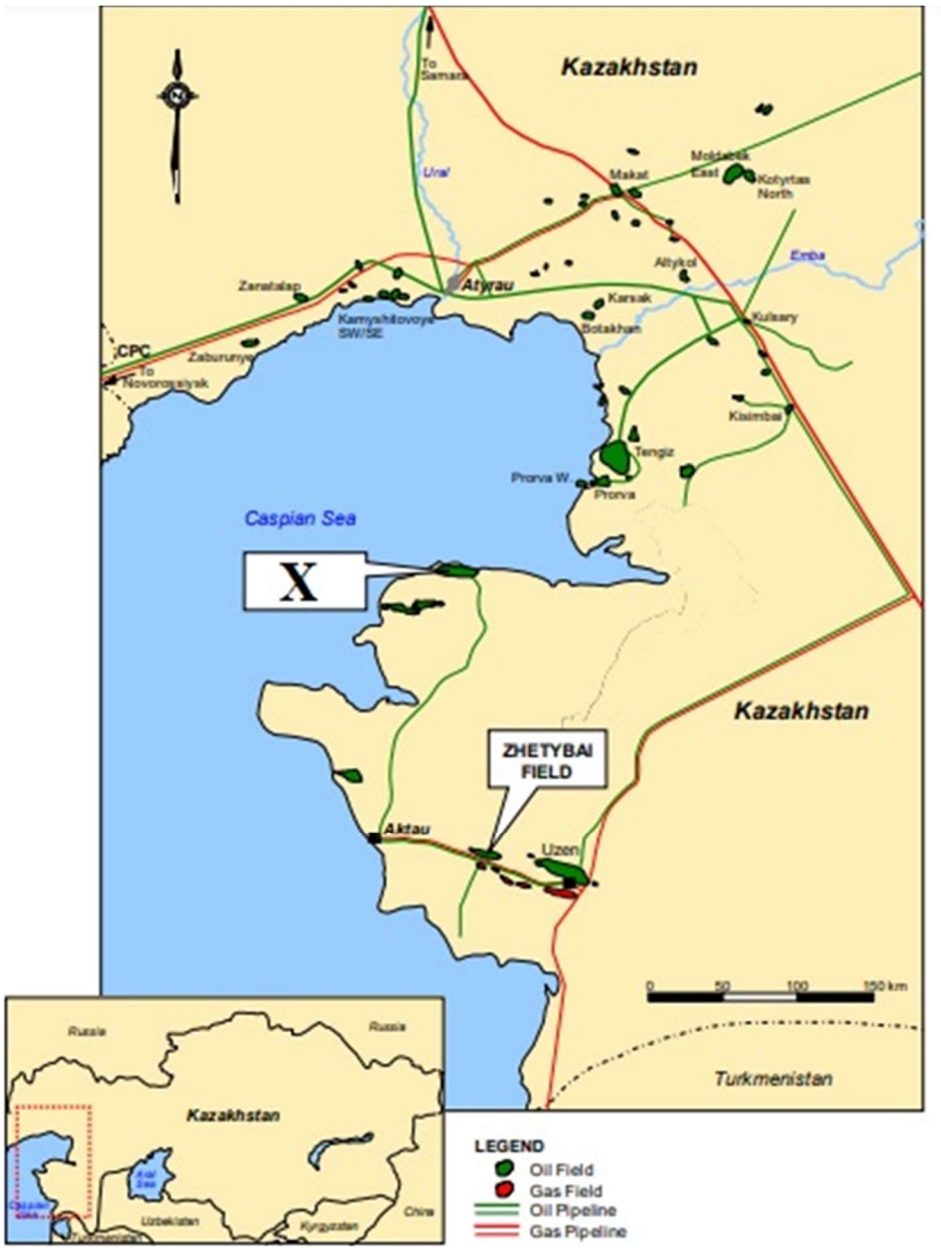


Figure 5 – Overview map of the field (mmgz_public_report_resources_2017)

2.2 Lithological - stratigraphic characteristics

In Field X, the section uncovered by drilling is represented by sedimentary deposits of Triassic, Jurassic, Cretaceous and Quaternary ages. The maximum thickness of the uncovered deposits is 4002 m (well P-1).

Mesozoic group (Mz)

Triassic system (T)

The Triassic system is represented by the lower and middle sections.

Lower section (T_1)

Induan-Olenekian stages (T_1 *i*-T_1 *o*)

The Triassic deposits of the lower section consist of the Induan and Olenekian stages. The Induan-Olenekian stages are represented by irregularly interbedded mudstones and sandy-siltstone rocks. They are distinguished by variegated, predominantly red-colored, brown colors of various tones predominate, with red, purple and gray hues.

Middle section (T_2)

Anisian-Ladinian stage (T_2 *a*-T_2 *l*)

The deposits of the Middle Triassic are represented by irregularly interbedded sandy-silty and clayey rocks. Rare interlayers of limestones and tuffaceous rocks are noted. The predominant color of the rocks is gray and light gray, often with a greenish tint.

Jurassic system (J)

Jurassic deposits are represented by the lower, middle and upper sections. The thickness of the Jurassic rocks varies significantly from 270 to 460 m, as it is explained by the erosion of the Jurassic sediments and tectonic dislocations of rocks, which were decisive in the formation of the X structure.

Twelve productive horizons have been identified from the Jurassic system, of which five (J-5C, J-4C, J-3C, J-2C, J-1C) have a limited distribution on the limbs and periclines of the structure, and seven (J-I, J- II, J-III, J-IV, J-V, J-VI, J-VII) are distributed in the vault of the structure.

Lower section (J_1)

The Lower Jurassic lithological deposits are composed of fine-grained siltstones with inclusions of carbonized plant residues.

Middle section (J_2)

The Middle Jurassic includes the Aalenian, Bajocian, and Bathonian stages.

Aalenian Stage (J_2*a*)

The lithological deposits of the Middle Jurassic of the Aalenian Stage are predominantly composed of clayey deposits, respectively, sandy-siltstone rocks, which are observed in the upper part of the section. A feature of the Aalenian Stage is the abundant presence of plant organic matter. The rocks of the Middle Jurassic deposits are distinguished by gray, light gray and greenish gray shades. The productive horizons of the middle section are J-4C to J-VII.

Bajocian stage(J_2 *b*)

Productive horizons J-I are confined to these deposits; J-II; J-III; J-IV; J-V.

The sequence is composed of uneven interbedding of sandstones, siltstones and clays.

Sandstones are gray, fine-grained, dense, non-carbonate. Siltstones are coarse-fine-grained, polymictic, gray with a brownish tint. The clays are silty, gray with inclusions of charred plant detritus. Among the micro-phytofossils identified: myospores, microphytoplankton algae.

The thickness of the Bajocian rocks varies on average from 105 to 150 meters.

Bathonian stage (J_2 *bt+k*)

The productive horizons J-1C, J-2C, J-3C, J-4C are confined to the Bathonian deposits. Lithologically, they are represented by intercalation of light gray siltstones with a greenish tinge with the inclusion of charred plant remains, fine-grained, non-carbonate sandstones with thin interlayers of clayey and carbonate rocks.

The thickness of the Bathonian-Callovian deposits varies from 0 meters (complete wedging out in the crest of the structure) reaching a thickness of about 120 meters in the western part of the deposit.

Upper section (J_3)

Kimmeridgian Tithonian stage (J_3*km+tt*)

Upper Jurassic deposits are of limited distribution and belong to the Kimmeridgian-Tithonian stage. These deposits include the productive J-5C horizon and the J-4C horizon with erosion on the rocks. According to lithological features, the Kimmeridgian-Tithonian deposits are divided into two parts: the lower - terrigenous and the upper - carbonate which are represented by siltstones, clays, limestones and dolomites.

The section of the Jurassic stratum consists of horizon J, 10-15 m thick, which transgressively overlies the underlying sediments and is represented by sandy-silty rocks.

Cretaceous system (K)

The deposit contains deposits of the Cretaceous system of the lower and upper sections. They include the stages of the lower division as: Berriasian-Valanginian, Hauterivian, Barremian, Aptian, Albian stages. Stages of the upper section: Cenomanian and Santonian-Turonian stages.

Paleogene-Neogene system

Paleogene-Neogene deposits in the section are absent as a result of erosion.

Quaternary system (Q)

Quaternary deposits are represented by modern solonchak formations.

During the Ice Age, most of the land was covered with ice, and the vegetation was mostly tundra, which included mosses, sedges, shrubs, lichens, and stunted grasses; however, during the interglacial period, or the time when most of the soil was not covered by ice, woodlands and coniferous forests existed. The emergence of tropical forests occurred during the beginning of the Holocene. This habitat has allowed many animals and plants to thrive. During this period, coniferous and deciduous forests developed, as well as savannahs, where herbivores grazed and flourished.

2.3 Oil and gas potential

At the Buzachi arch, oil field were found in continental and coastal marine deposits of the Jurassic and Lower Cretaceous periods at depths of 300-1000 m in the Karazhanbas, North Buzachi, Zhalgiztyube, East-Karaturun and Kalamkas fields. These deposits are located on the east-west anticlines (Figure 6).

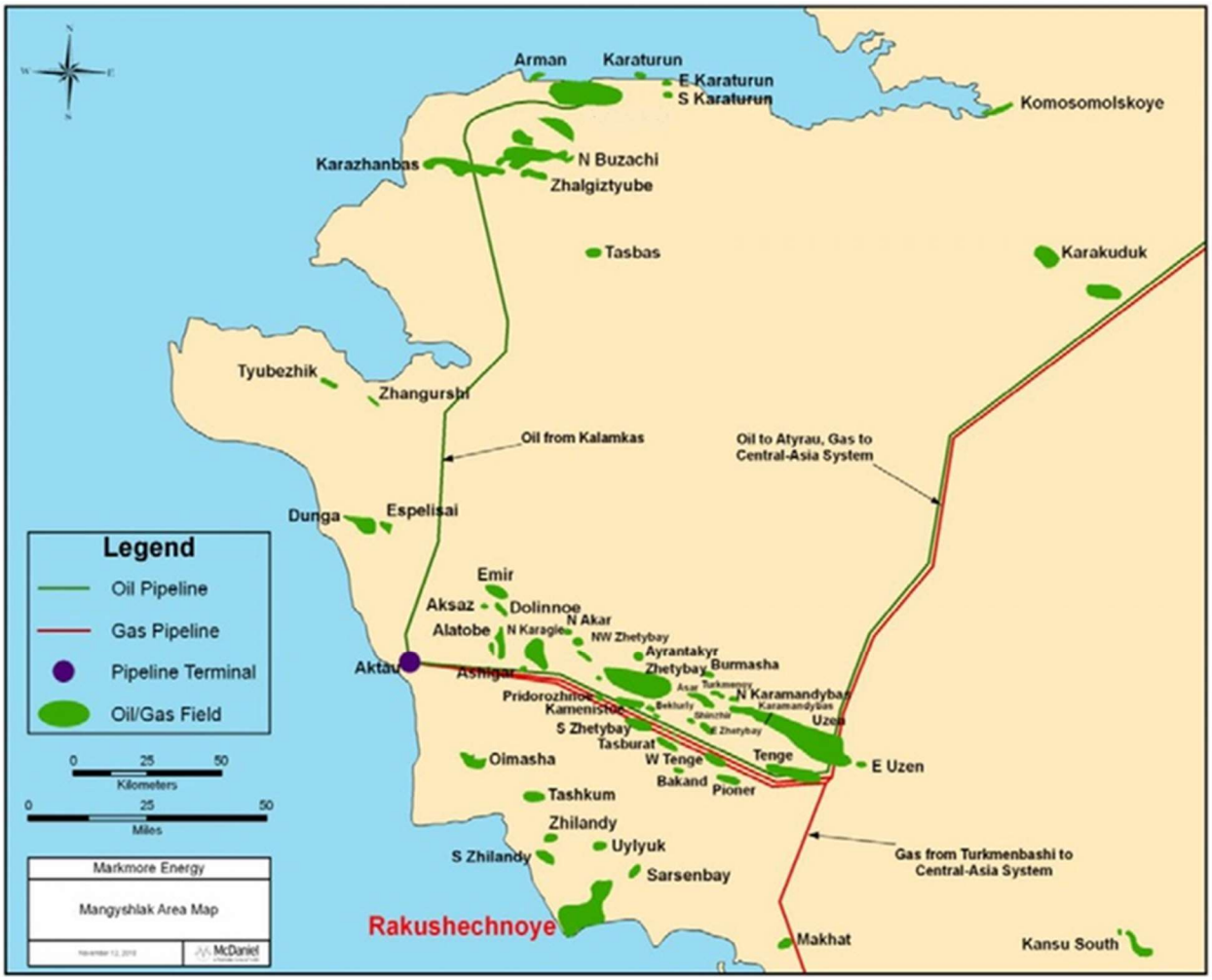


Figure 6 – Fields location (mavink.com)

In general, the reservoirs of the X field are characterized by sandstones from the Early Cretaceous to the Middle Jurassic. Early Cretaceous sandstones contain gas and Jurassic sandstones contain oil. Free gases are present in the Upper Jurassic gas cap; Early Cretaceous gas deposits are found in stratigraphic reservoirs that do not contain gas-water contact (GWC). Basically, the thickness of the oil and gas saturation of the Jurassic reservoirs is about 50-100 m. The gas-oil contact (GOC) on this side is mostly stable (Figure 7).

Twelve horizons were identified in the section of the Jurassic horizons, five of them (J-5C, J-4C, J-3C, J-2C, J-1C) have a limited distribution on the limbs and periclines of the structure. They are associated with stratigraphically screened deposits. Seven deposits (J-I, J-II, J-III, J-IV, J-V, J-VI, J-VII) are distributed in the

crest of the structure. Reservoir arched deposits are confined to them. Oil production is carried out from the Jurassic horizons.

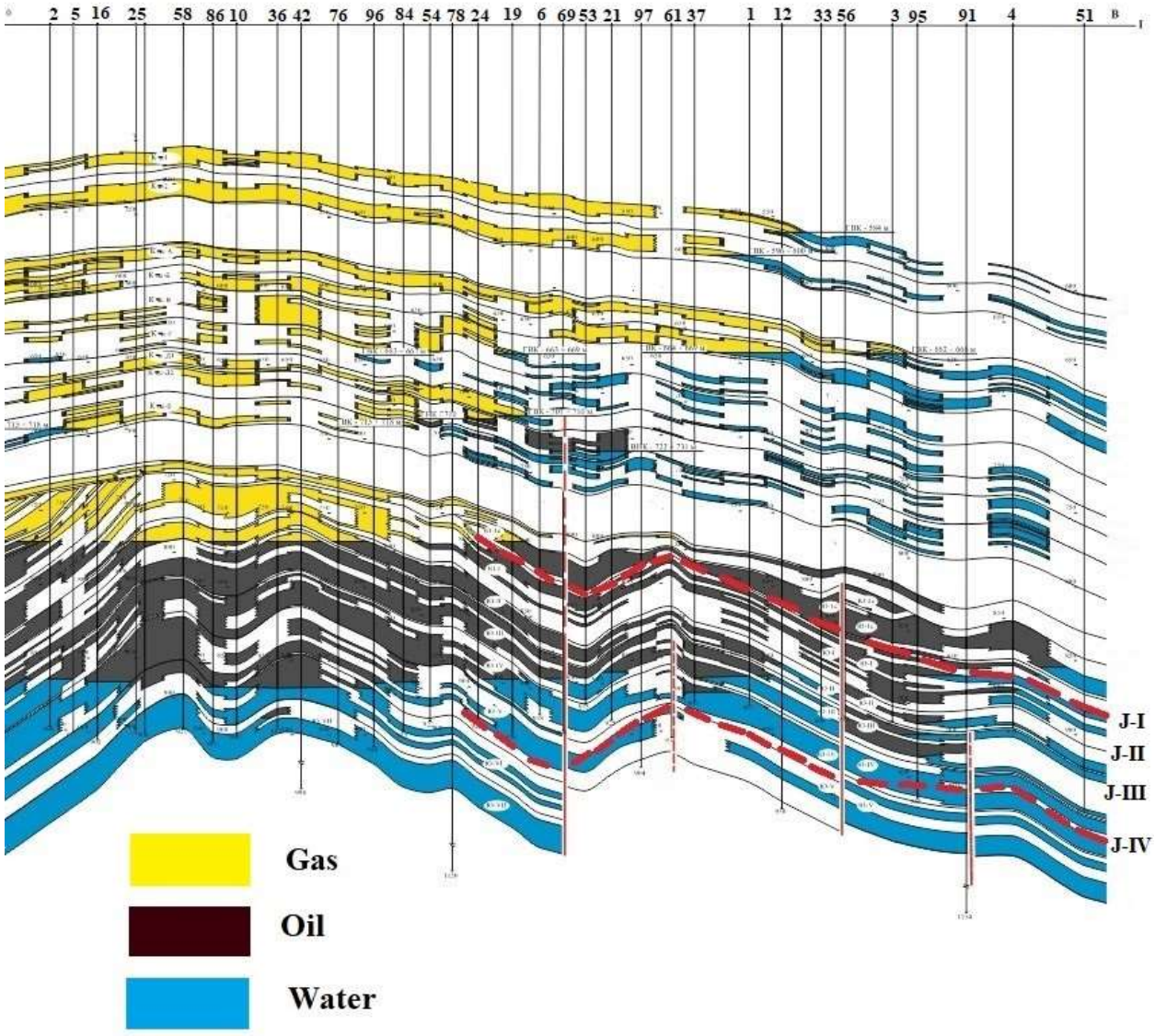


Figure 7 – Geological profile of the X field

In addition to these horizons, a sand-siltstone layer with a thickness of 10-15 meters (J) lies in the top of the Jurassic deposits, stratified by the materials of the work as deposits of the Lower Cretaceous age. The oil and gas reservoir associated with this reservoir is a return target.

3 Project part

3.1 Sedimentological analysis

Sedimentological analysis is the study of sedimentary rocks and the processes of their formation. It includes the study of the physical, chemical and biological characteristics of sediments, their structure, texture, composition and age, as well as the history of their formation and transformation.

Through sedimentological analysis, researchers seek to understand the conditions under which sediments formed, transported, and accumulated. They can study modern sedimentary processes in oceans, rivers, lakes, or deserts, as well as analyze the history of the earth's crust by studying archaeological or geological deposits (Figure 8).

The environment of sedimentation is a set of conditions in which precipitation accumulates. To determine the environment of sedimentation, such analyzes are made as: sedimentological, attribute, geophysical well survey.

The deposits that have studied represent, from the analysis of core material data, the identified lithofacies indicate the nature of the deposits that were formed in deltaic, continental and coastal-marine conditions.

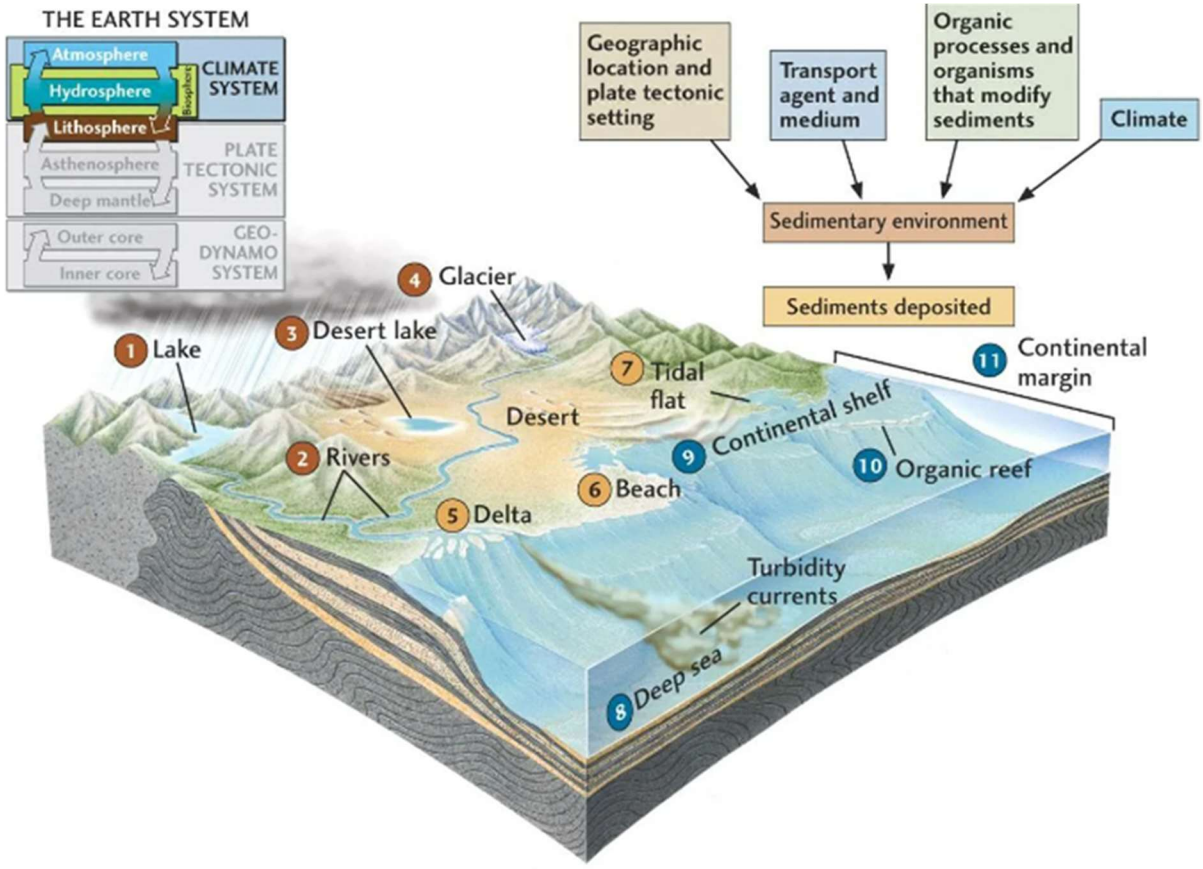


Figure 8 – Classification environment sedimentation (ricardogeoufrgs.blogspot.com)

Core Description

In the sedimentological analysis of the Jurassic productive horizons of the field, for a detailed description of the core data, the results of standard and special laboratory core studies were taken into account in 5 new appraisal wells No. #1, #2,#3,#4,#5 with a total footage of 393.55 m.

It was also the selected core data for the wells are located in different blocks separated by tectonic faults. Wells #4 and #3 are located in the western part of the field, well #2 in the central part, and wells #1, #5 in the eastern part of the field, confined to different tectonic blocks (Figure 9).

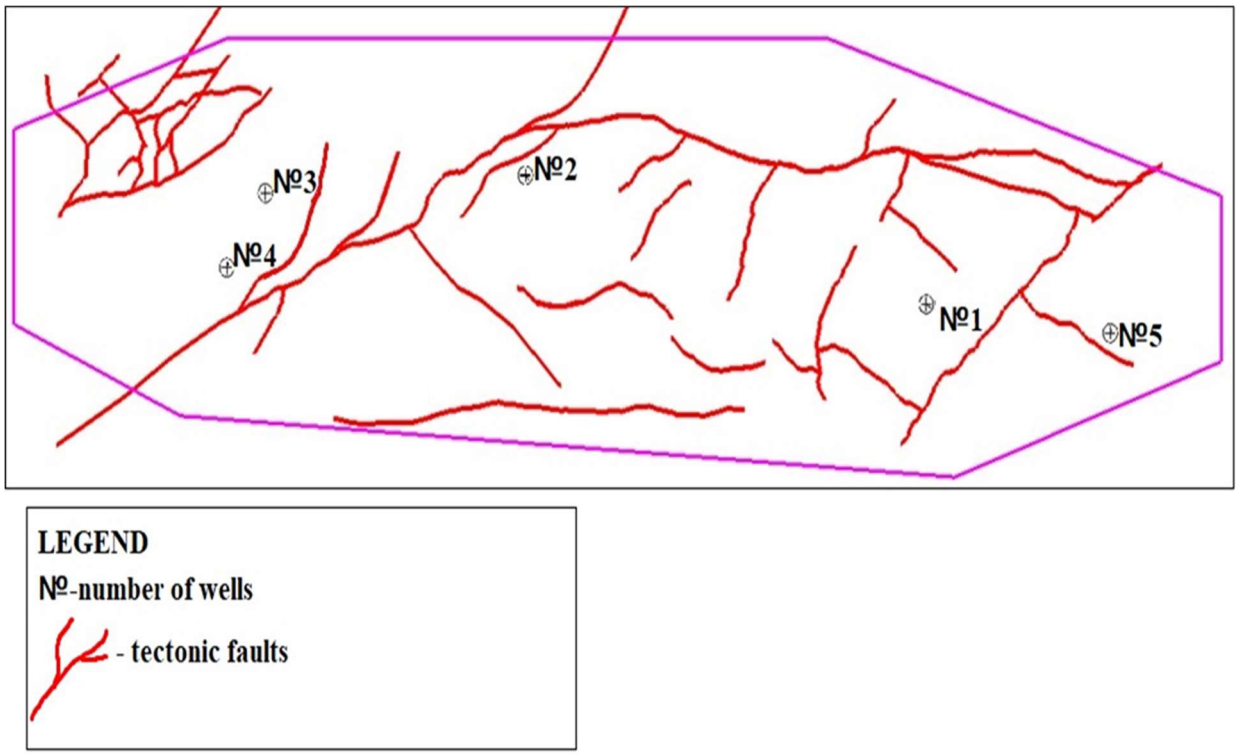
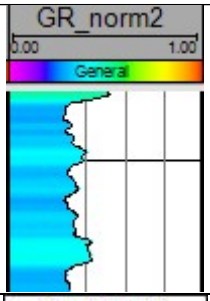
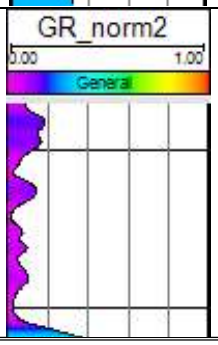
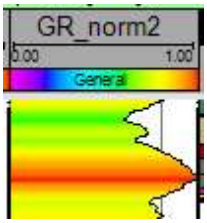
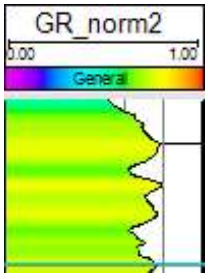
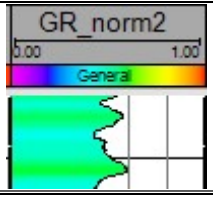


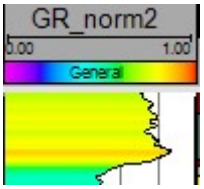
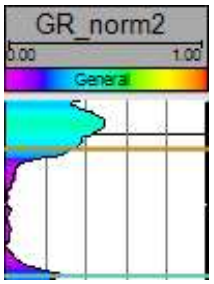
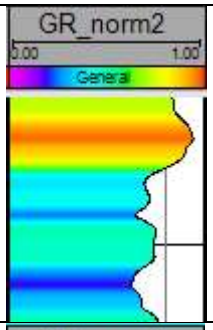
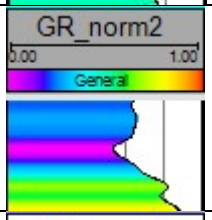
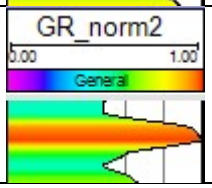
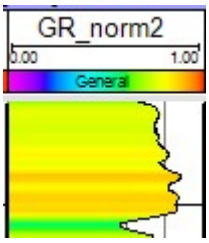
Figure 9 – Map of the location of wells on the structure

3.2 Seismic data on lithofacies

Studies of the facies conditions of sedimentation are based on core materials, as well as on the characteristic features of the configuration of the negative anomaly of the gamma ray (GR) curves, within the identified horizons. The configuration of the lateral line of the gamma ray (GR) curve reflects the nature of the structure and changes in the composition of the rocks that make up the given reservoir along the vertical. This configuration of the sideline of the gamma ray log curve often indicates the hydrodynamic conditions under which this formation was formed (Table1).

Table 1– Below is a summary table of identified lithofacies.

Facies	Sub-facies	Micro facies	Lithological composition	Characteristic by GR curve
Alluvial plain	Channel sediments	3	Fine-grained sandstones	
		4	Medium-grained sandstones	
		5	Coarse-grained sandstones	
Alluvial plain	Floodplain sediments	6	Interbedded clays and sandstones	
		7	Interbedded sandstones and clays	
		8	Interbedding of clays, siltstones, sandstone and carbonaceous material	
		0	Coal	

Transitional environment	Lagoon	11	Interbedded siltstones and clays	
Marine	Shallow water	9	Organogenic limestone, fine crystalline	
		10	Carbonate Cement Rocks	
		12	Sandstone with carbonate cement	
	Deep sea deposits	1	Clay	
		2	Siltstones	

3.3 Analysis according to geophysical well survey

Horizon I

On the G-I horizon, core samples were taken from Wells #3 and #1 (Figure 10).

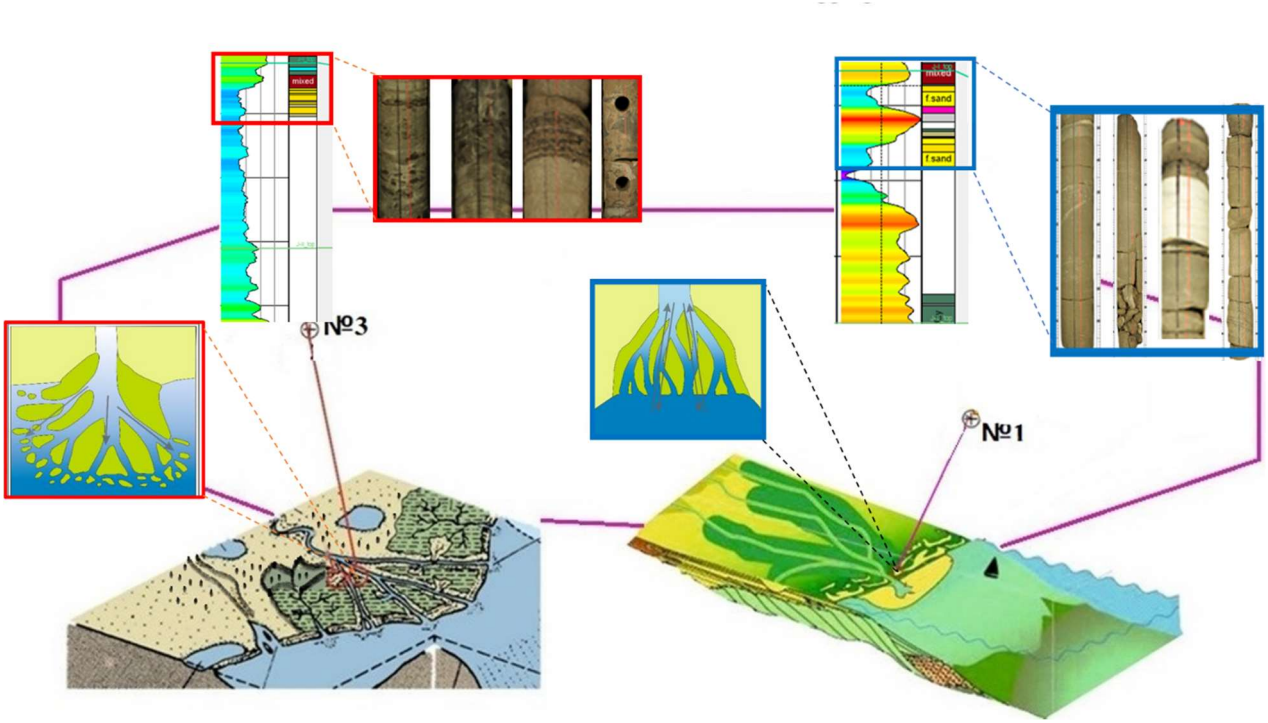


Figure 10– Model of sedimentation conditions and GR for horizon J-I

Well #3

The core in well #3 is represented from below by oil-saturated sandstone, there are clay fragments. According to the curve, the lower part of the GR curve is represented by a thick sand layer underlying clayey-silty rocks.

3 lithofacies is represented by fine-grained, polymictic, micaceous, brown, oil-saturated sandstone, with rare layers of carbonaceous material, emphasizing discontinuous bedding, with clayey cement and inclusions of charred plant remains.

4 lithofacies is represented by medium-grained, polymictic, micaceous, brown, oil-saturated sandstone, with rare layers of carbonaceous material, emphasizing discontinuous and horizontal layering, with clayey cement and inclusions charred plant remains.

Well #1

Core material from well #1 covers the lower and upper part of the horizon. The upper part of the horizon is represented by fine-medium-grained sandstone, sandstone with carbonate cement and clays. Lithofacies data are correlated by (GR) curve with increase and decrease, which indicates deposits of regressive and transgressive processes. The presence of sandstone with carbonate cement indicates the influence of marine depositional conditions. The lower part of the horizon is represented by shale deposits.

Horizon II

This horizon is represented by coring in two wells #2 and #1. The total core sampling is 26.28 meters.

The core collected in well #2 covers the entire horizon and is represented mainly by alternating sandstone with interbedded shale-silty deposits. The upper part

of the section is composed of frequent interbedding of clay, siltstone and sand deposits and coal layers characteristic of more calm alluvial deposits.

The core presented in well #1 covers the lower and upper parts of the horizon. The lower part of the horizon is composed of interbedding clay-siltstones, in the middle part of the interval, fine-grained sandstone. Up the section, the horizontal bedding changes to oblique unidirectional. This direction of layering indicates low hydrodynamics with an oblique mode of sediment transport.

The upper part of the horizon is represented from below by a loose core of sand with a hydrocarbon smell and fine-grained oil-saturated sandstone, with inclusions of charred plant remains and shell detritus. The presence of siltstone with carbonate cement indicates the influence of marine conditions and that these deposits were formed with transgression in the coastal zone. (Figure 11).

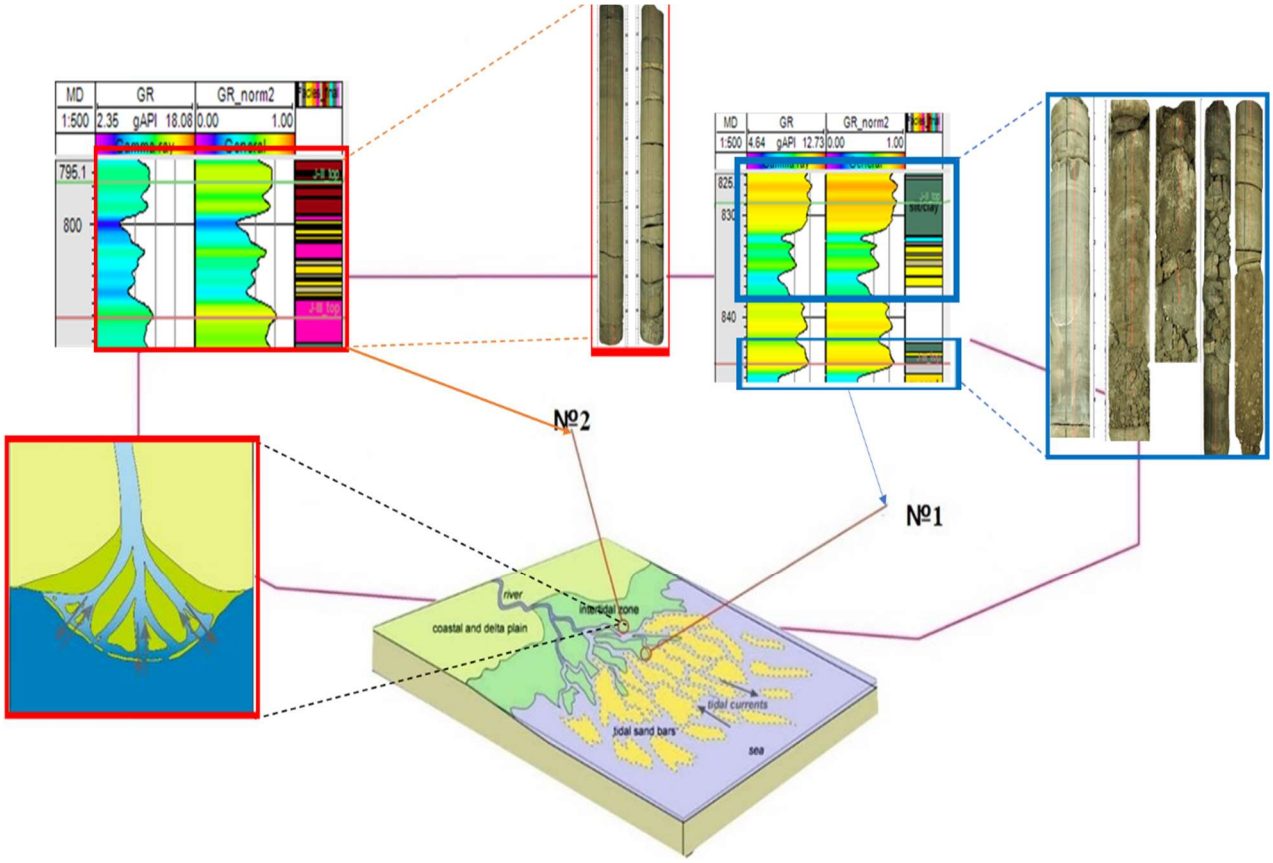


Figure 11 – Model of sedimentation conditions and GR for horizon J-II

Well #2

Covers the entire horizon

From bottom to top transgression of the sea, distributive channel.

Well #1

Covers the bottom and top of the horizon

The lower part of the horizon is represented by intercalation of clay-siltstones, in the middle of the interval it is characterized by fine-grained sandstone. Up the section, horizontal bedding changes to oblique unidirectional bedding. Such layering indicates low hydrodynamics with a unidirectional regime.

The upper part of the horizon is represented below by a loose core of sand with a hydrocarbon smell and fine-grained oil-saturated sandstone. Sandstones with inclusions of charred plant remains and shell detritus. Carbonate siltstone layer - influence of marine conditions these deposits were formed in the coastal zone with the transgression of the sea.

Horizon III

The horizon is characterized by the core of wells #1,#2,#3,#4,#5. The core sampling for this horizon is more than 58 meters.

The core sampled in wells #3 and #4 is present only in the lower part of the horizon. It is characterized by the alternation of several lithofacies with the presence of a layer of oil-saturated sandstone between the clayey-siltstone deposits of the interchannel bay. Lithofacies are predominantly represented by facies of interchannel bays and interchannel sandstones ending in classical coalified material.

The core presented in well #1 covers the upper and lower parts of the horizon. According to the (GR) curve, it can be divided into several cycles with an increase and decrease in the clay content of the deposits (Figure 12).

The lower part of the horizon is represented by siltstone, up the section it is replaced by fine-grained oil-saturated sandstone. The sandstone layer is covered with a coal layer 0.12 m thick, which indicates stagnant sedimentation conditions.

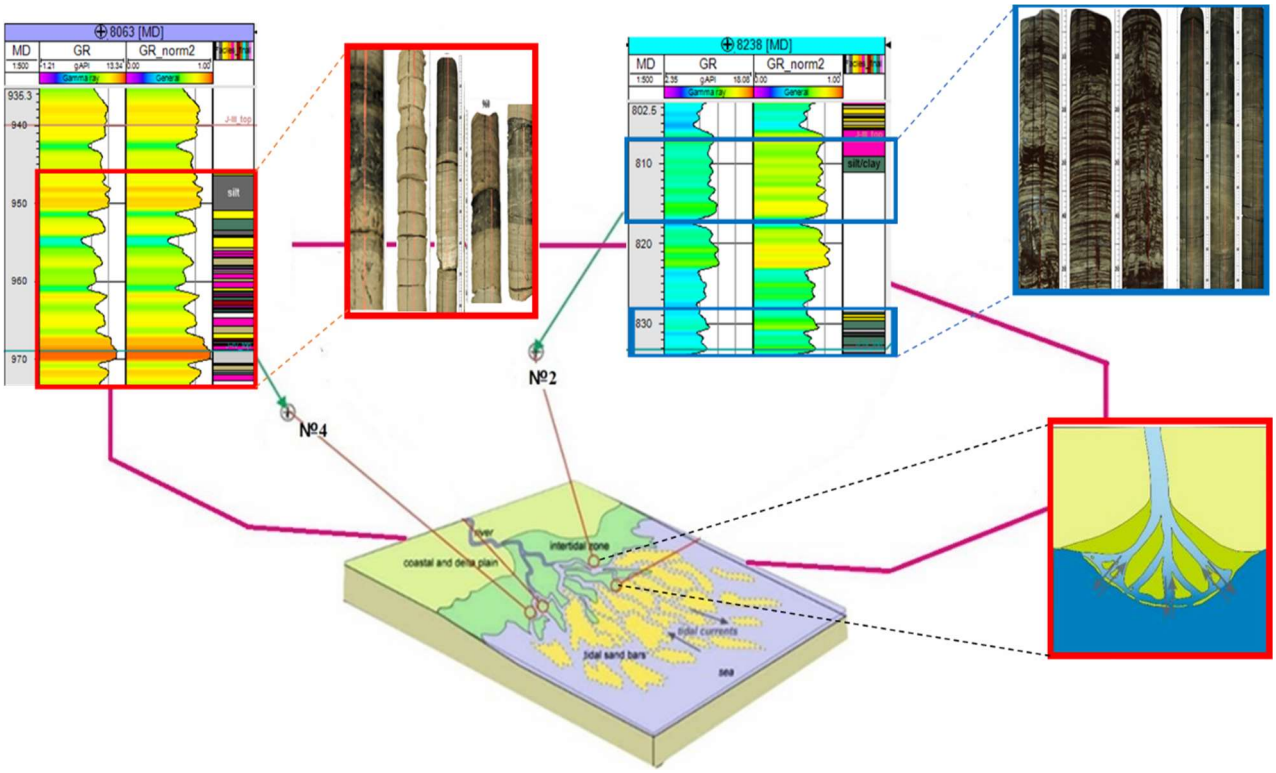


Figure 12 – Model of sedimentation conditions and GR for horizon J-III

Well #4

The core covers the lower part of the horizon in the core section, we can see 5 cycles based on the coal layers. By the presence of coal, the drainage of water can be identified.

Well #2

The core presented in well #2 covers the lower and upper parts of the horizon. By the nature of the (GR) curve, this horizon is represented by two sedimentation cycles, in particular, an increase in clay content was observed up the section. In the first cycle, there are sandstone deposits with intercalation of clays and siltstone, and in the second, only clays predominate. Abundant vertical traces of mud beetles are noticeable, which mainly live in shallow water, lagoons.

Horizon IV

Horizon G-IV was characterized by core from wells #1,#2,#3,#4,#5. The total sampling was 45.06 m of core. The highest recovery is presented in well 8238, with a recovery of about 73%, and for the rest of the wells, the recovery is less than 45%. (Figure 13).

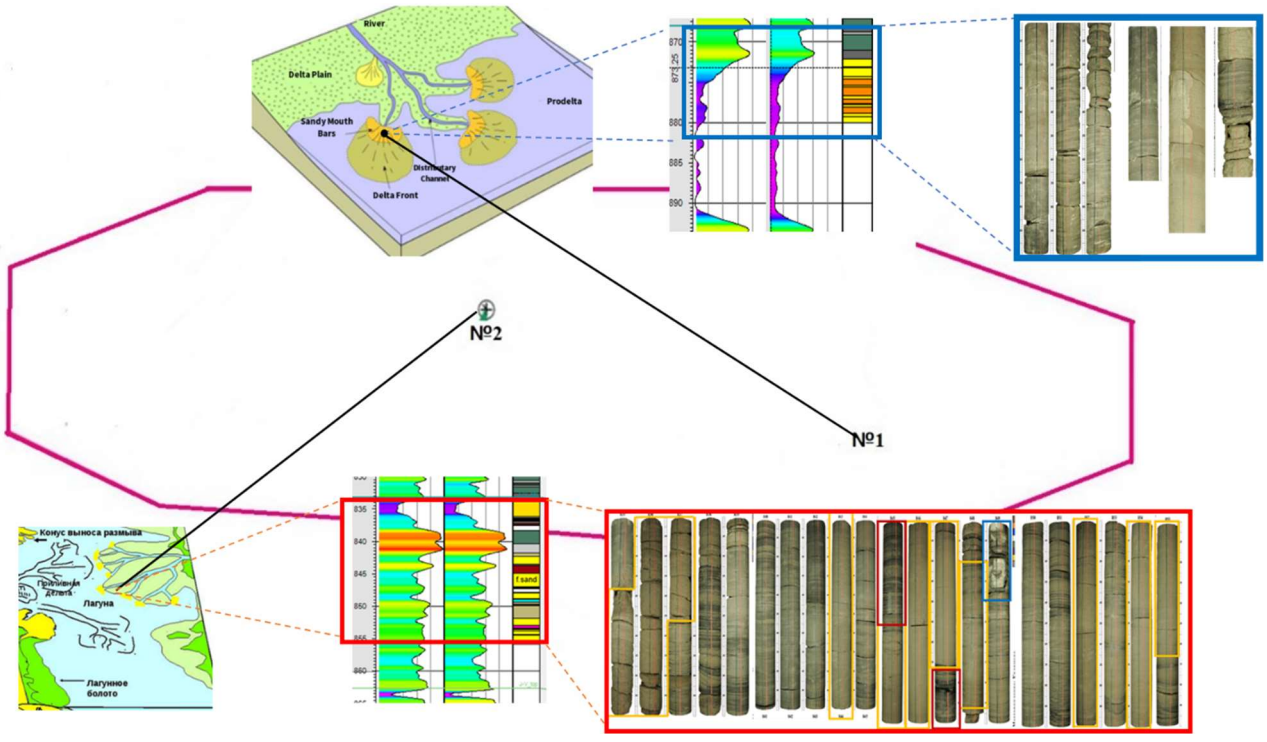


Figure 13 – Model of sedimentation conditions and GR for horizon J-IV

Well #1

The core recovery in well #1 shows a local incision of a sand body with a thickness of about 20 meters. Sandstones are fine-grained and medium-grained with hydrocarbon smell. As well as in well #4, an incision of siltstone with carbonate cement is observed in the section, which indicates shallow water conditions of sedimentation. The sandstones of this horizon are represented by the minimum

values on the (GR) curve. The encountered thick layer of sandstone, underlain from above and below by clayey-silty rocks, is characterized as a sand bar of delta channels.

The core recovery in well #1 shows a sand body incision with a thickness of more than 8 meters. According to the description, sandstones are fine-grained, medium-grained with a hydrocarbon smell. An incision of carbonate siltstone is also observed, which may indicate the influence of marine sedimentation.

Well #2

According to the core of well #2, we can observe a sedimentation cycle with an increase and decrease in the level and speed of water. From below, the horizon is characterized by fine-grained oil-saturated sandstone, further up the section, smooth contact with interbedding of clays, then the repetition of this cycle. Further up the section, there is a thin interbedding of carbonate siltstone, clayey material, sandstones, and carbonaceous material with charred plant residues inclusions. The carbonation of the rock indicates the influence of marine conditions. Further, there is also a cycle of sandstones and interbedding of clays and siltstones. The cut of medium-grained oil-saturated sandstone indicates an increase in hydrodynamics.

3.4 Attribute analysis of seismic data

Attribute analysis - This method allows researchers to identify relationships between sediment attributes and certain processes and conditions of sediment formation. Attribute analysis in sedimentology can help in understanding factors such as the source of sediment material, transport energy, environment, sedimentation conditions, and other processes that affect the formation and characteristics of sediment deposits. This analysis plays an important role in the reconstruction of the history of the earth, the study of the environment and the assessment of the oil and gas potential of the regions.

Types of seismic attributes

RMS *amplitude* (Root Mean Square) amplitude

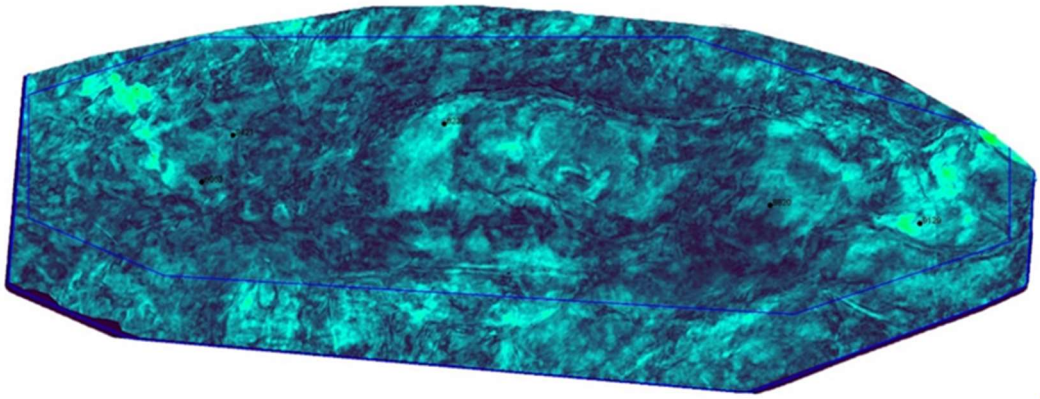
In the attribute analysis of seismic data, RMS amplitude (Root Mean Square) amplitude is one of the calculated parameters used to extract additional information about the structure and properties of underground formations. RMS amplitude is a measure of the average amplitude of seismic waves in a given time window or frequency range. Visualization and analysis of RMS amplitude values can help distinguish boundaries between different lithological or geological formations, as different types of rocks or structures can have different amplitudes of seismic waves.

RMS amplitude provides a measure of the energy or power of seismic waves. Higher RMS amplitude values indicate greater seismic activity strength or energy, which may be associated with certain geological structures or processes.

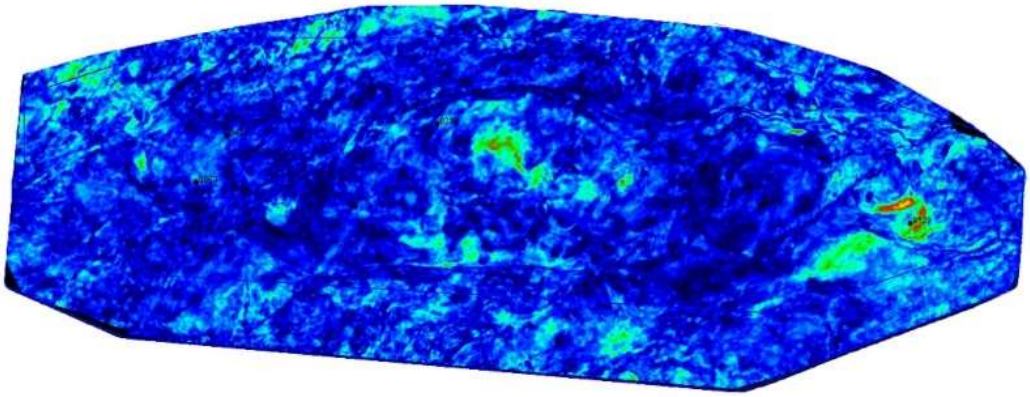
RMS amplitude contain some information about rock type or lithological properties. Different types of rocks and structures may have different amplitudes of

seismic waves. Analysis of RMS amplitude values in different regions or depths can help highlight zones with specific lithological characteristics (Figure 14).

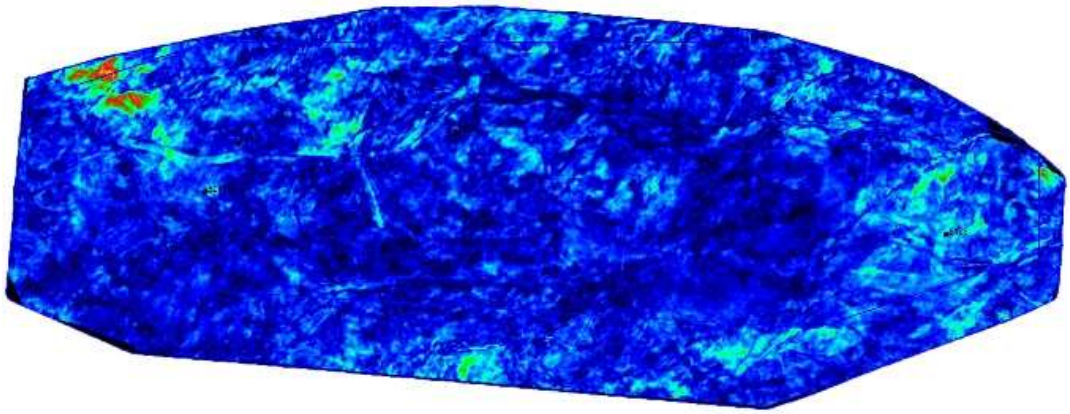
in the geological structure of the formation boundaries, fractures or the presence of gas or oil can contribute to the change in the amplitude of seismic waves. RMS amplitude can be used to highlight such boundaries or structures and provide more detailed data analysis.



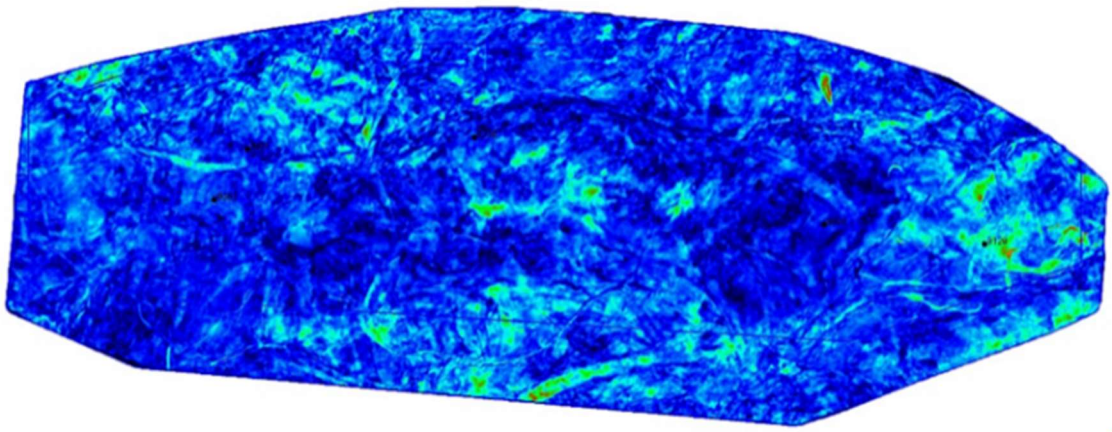
J-I



J-II



J-III



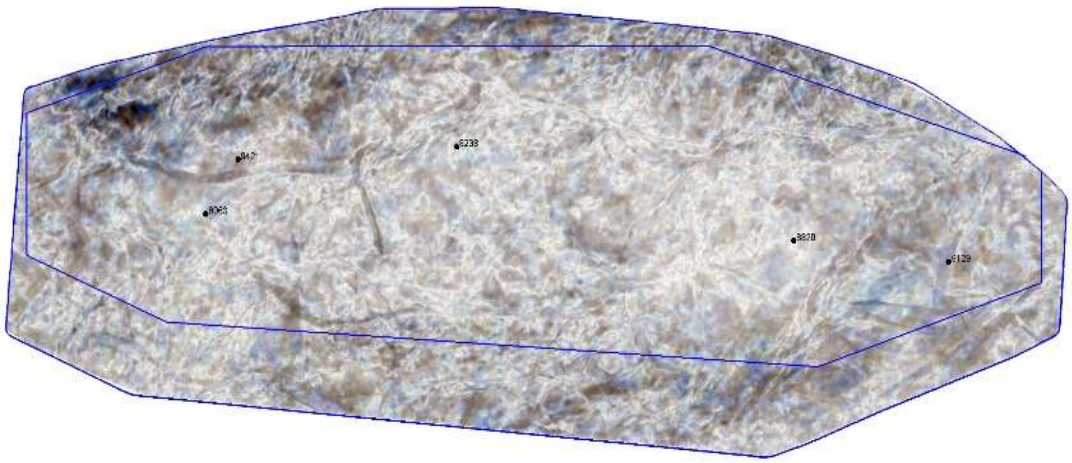
J-IV

Figure 14 – Slice within J-I, J-II, J-III and J-IV of the productive horizon of the attribute cube

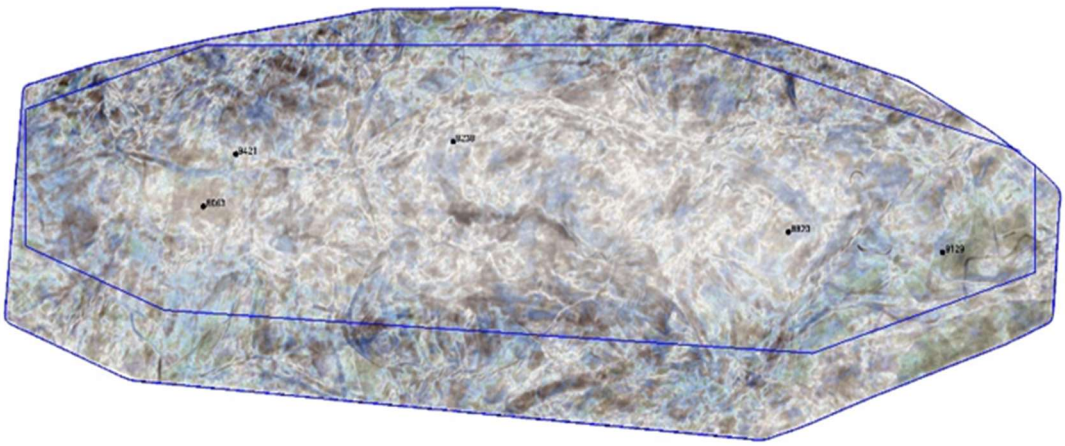
EXchromaSG

Allows to examine and analyze attributes of seismic data or other geological parameters, such as amplitude, phase, frequency. This helps to identify geological structures, lithological properties, fractures, boundaries and other characteristics. Interprets geological data in three-dimensional space, such as seismic interpretation models or geological models (Figure 15).

EXchromaSG - converts a 3D seismic data volume into a continuous color zone consisting of structurally enhanced red(R), green(G) and blue (B) (RGB) volumes, structural volume, and structurally expanded amplitude. Seismic data is information obtained from geophysical surveys that allow you to study the underground structure and search for oil and gas fields.



J- III



J-IV

Figure 15 – Cut within the J-III and J-IV productive horizon of the attribute cube true amplitude

According to the detailed sedimentological analysis of the core and the results of the macrodescription of the rocks, 13 lithofacies were identified (Table 2).

Table 2 – Lithofations according to the description of the well core

№	palette	Lithofacies
0		coal
1		clay
2		siltstone
3		fine-grained sandstone
4		medium-grained sandstone
5		coarse sandstone
6		interbedding of clays and sandstones
7		interbedding of sandstones and clays
8		interbedding of clays, siltstones, sandstones and carbonaceous material
9		limestone
10		rocks with carbonate cement
11		interbedding of and clays and siltstones
12		sandstone with carbonate cement

It should be noted that 3-5 coarse-medium and fine-grained sandstone facies have the best petrophysical properties, and the porosity reaches 38% with a permeability of more than 1500 mD. shows the permeability-to-porosity ratio by lithofacies to better illustrate the variability in petrophysical properties (Figure 16).

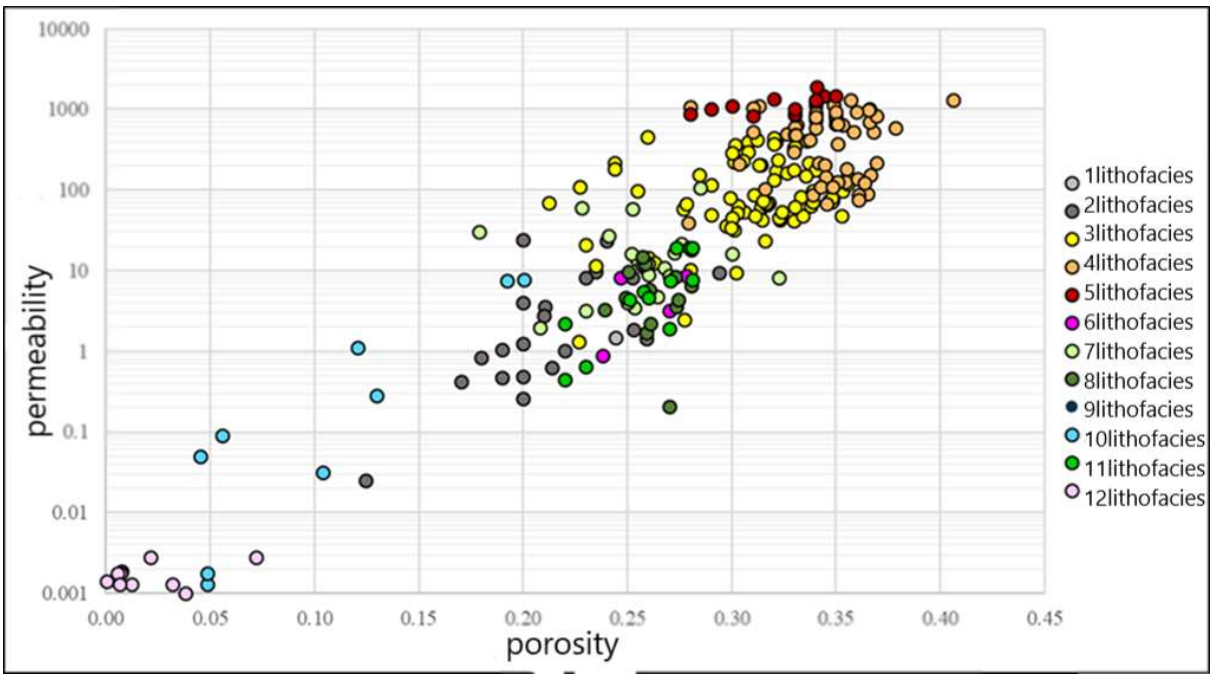


Figure 16 – permeability to porosity ratio by lithofacies

Table shows the seismic facies identified in field X in order to separate reservoirs by petrophysical properties.

Figure shows the dependences of permeability on porosity for four seismic facies: a) improved channels, b) degraded channels, c) floodplain, d) degraded floodplain (Table 3).

Table 3 – Codes and seismic facies for field X

Facies code	Seismic facies	Seismic facies color
0	Improved channel	
1	Degraded channel	
2	Floodplain	
3	Degraded floodplain	
4	Clay	

The final enlargement of the facies in geological modeling led to the combination of facies 0 and 1 into one facies according to the best reservoir properties and was named as “Channel” and facies 2 and 3 into one facies as “Floodplain”. The enlargement of the facies is based on the percentage of clay and has certain reservoir properties (Table 4).

The facies cube is divided into 3 facies according to the quantitative content of clay:

- Facies 1 – Channel
- Facies 2 – Floodplain
- Facies 4 – Clay

Table 4 – Final enlargement of the facies

Facies code	Facies	Seismic facies color
1	Degraded channel	
2	Floodplain	
4	Clay	

3.5 Building a facies model

This chapter discusses the method of constructing a seismic-facies model based on data from the intra-annual flow distribution, which will later be compared with the results of core interpretation and attribute analysis.

The results of an intra-annual flow distribution 3D serve as inputs for two types of simulations.

First, structural modeling was carried out by constructing the framework of the future facies model, which is based on tectonic disturbances and structural surfaces of productive horizons.

The second is geometric modeling, which is based on the results of attribute analysis, namely RGB cubes obtained using the standard function (RMS).

The next step is petrophysical modeling. It includes structural and geometric modeling, as well as curves of the clay content coefficient obtained as a result of reinterpretation of the X field well stock.

According to the results of petrophysical modeling, volumetric distribution of clay properties over the area was obtained. In theory, for terrigenous reservoirs, namely, complex alluvial and deltaic types of reservoirs, this method is quite applicable. Thus, this makes it possible to see the dimensions of clayey rocks in space.

During the design process, the following materials were required to calculate the seismic-facies cube:

Coordinates of wellheads, altitudes, inclinometry;

Unified stratigraphic picks (markers) used as a basis in the formation of a structural framework;

Geophysical Well Surveys Used for Correlation, Lithotype, Facies, and Seismic Correlation

Seismic data. Structural maps and disturbance surfaces from seismic data are used to form a structural framework. Seismic attribute cubes are used to propagate data in the interwell space.

As a result, the facies are identified by the clay cube, which is common in degraded channels, floodplains and clay. Most of the floodplain and channel have a floodplain in terms of clay content, this is an indicator that there are good reservoirs here. Also, this zone is promising, which makes it possible to determine in which region oil can be produced from good reservoirs (Figure 17,18,19,20).

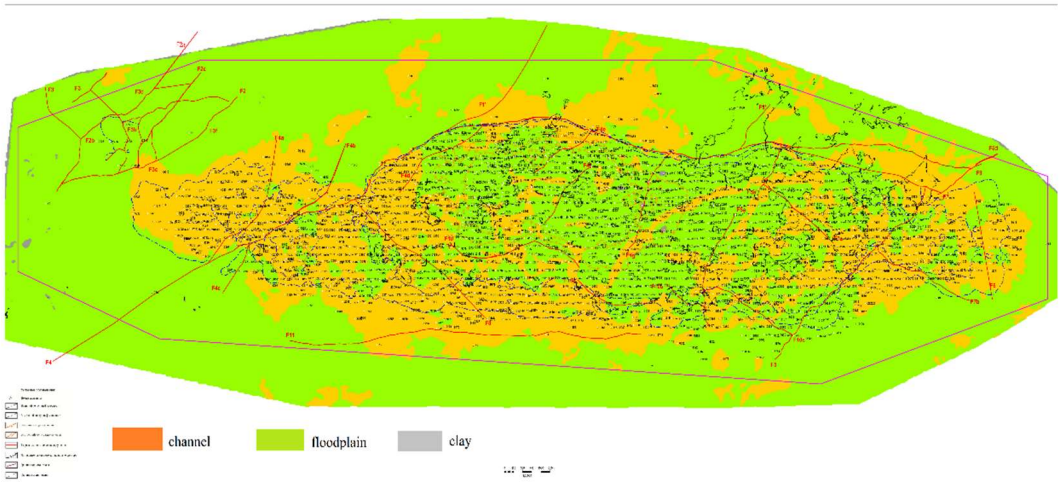


Figure 17 – Facies cube on the horizon 1

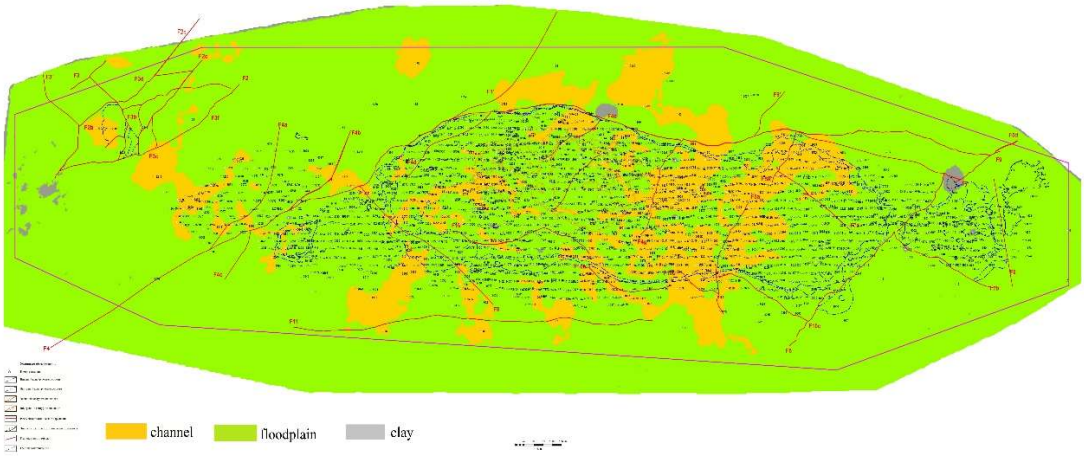


Figure 18 – Facies cube on the horizon 2

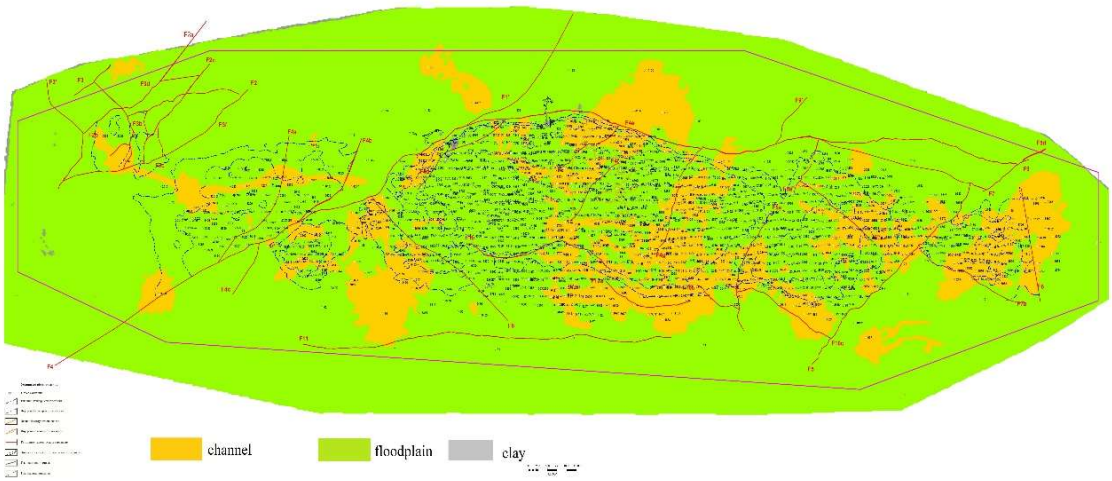


Figure 19 – Facies cube on the horizon 3

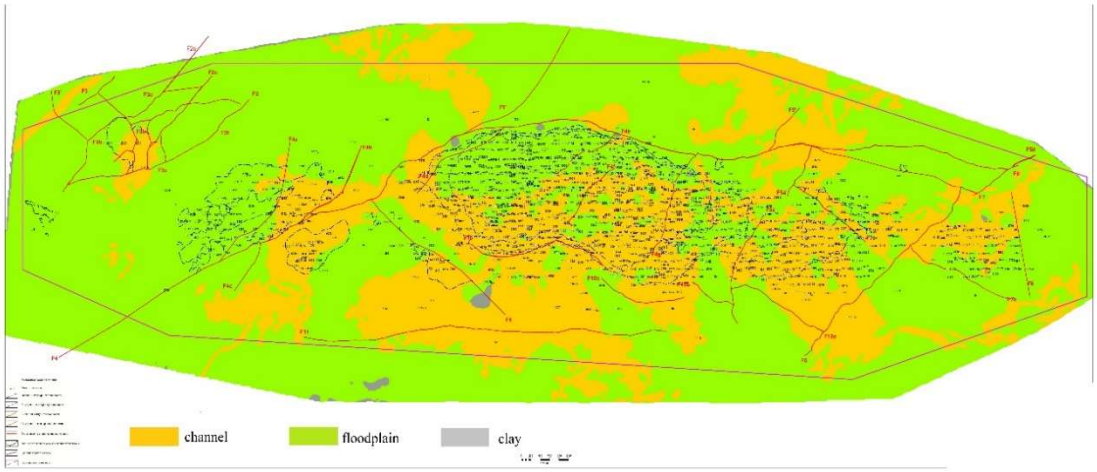


Figure 20 – Facies cube on the horizon 4

According to the core description, we can see here the result of high porosity and permeability of productive horizons.

The level of convergence shows 77%.

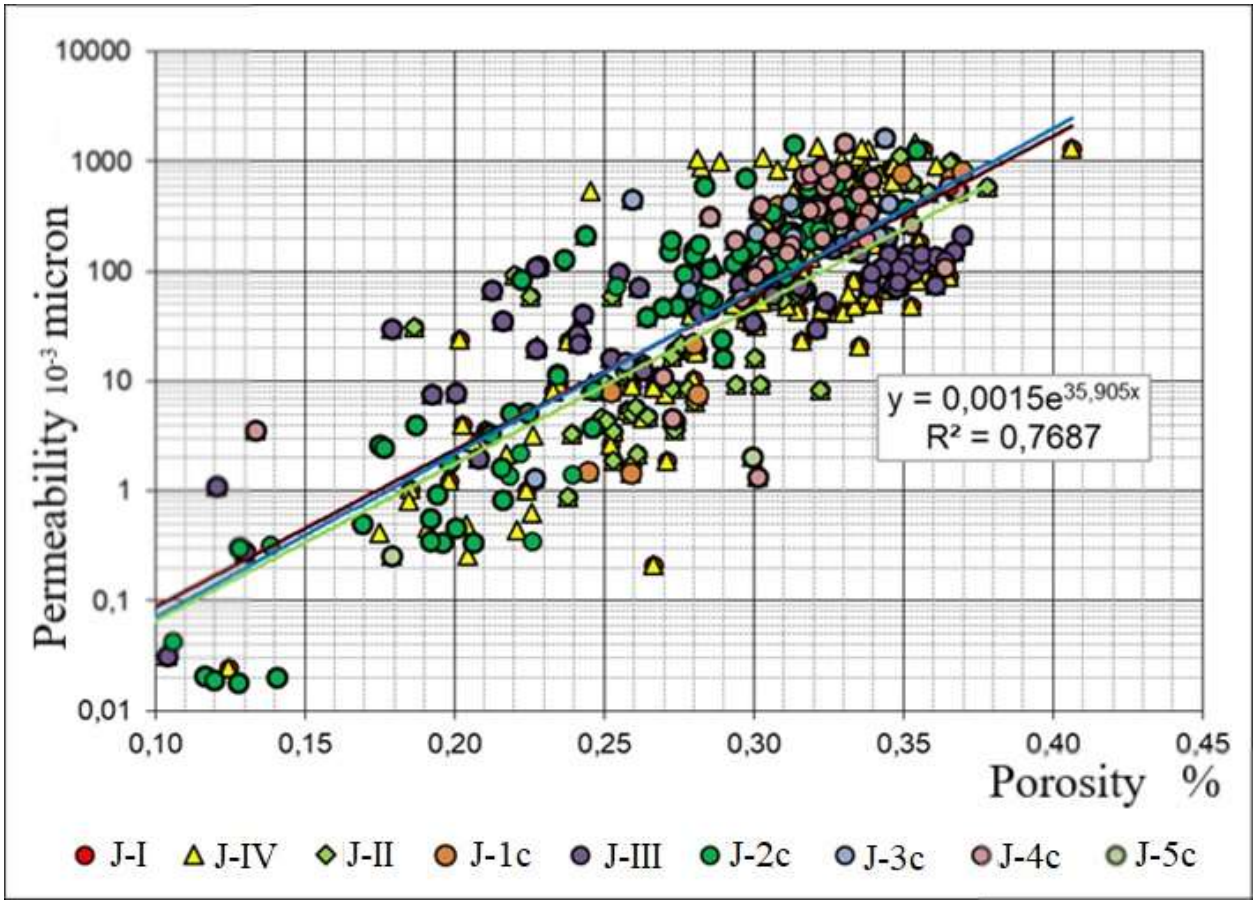


Figure 21 – Plot of relationship "porosity-permeability" for rocks of productive horizons

Conclusion

As a result of analysis of core data, the identified lithofacies indicate the nature of deposits formed in deltaic, continental and coastal-marine conditions. In general, it can be noted that in the top-bottom section there is a gradual transition from the delta plain to shallow and tidal depositional conditions.

The basis for confirming the assumptions put forward was the works of scientists of the Soviet Union, presented in the work "Lithological and Paleographic Atlas of the USSR." The set of maps, which is part of the Atlas, made it possible to reconstruct the history of the development of the territory of the Buzachi arch in the Jurassic period according to certain stages.

According to the Atlas of lithological and paleographic maps of the USSR (1975), the productive horizons of the X field are represented by:

• J-I, J-II, J-III, J-IV, J-V stages of the Bajocian and Bathonian stages, related to the coastal plain at times, flooded by the sea;

In the section of four wells #1, #3, #4 and #5, located on the structure in the western and eastern parts of the field, there are strong sandstones and siltstones with carbonate cement, limestones, which characterizes the influence of marine sedimentation conditions over the entire area of the object under study.

The delta environment is a difficult complex in which different depositional mechanisms and different environments operate. Deposits of the delta complex include deposits of distribution channels, estuarine bars, lagoons, tidal channels and interchannel bays of the delta plain.

The sand deposits uncovered by core materials belong to the sandstones of wellhead bars and distribution channels. The sandstone lithofacies of the mouth bars are genetically related to the coastal strip of the sea and formed at the junction of river and sea waters, where the river loses its speed and sheds the terrigenous material carried by it.

Lithofacies represented by intercalation of clays, siltstones, sandstones and carbonaceous material with resuspension, horizontal layering belong to the lagoonal deposits of the delta sedimentation complex. Also, the presence of abundant bioturbation and traces of silt beetles undoubtedly indicate the lagoonal conditions of sedimentation. During the period of sea level decrease, there is an increase in the influence of continental conditions of sedimentation, such as deposits of lagoons, inter-channel bays.

Thus, there is a consistent change in the conditions of sedimentation of productive layers of the Jurassic deposits:

- typically continental - horizon J-IV;
- transitional-coastal (shallow shelf) - horizons J-III - J-I, J-1C, J-2C;

REFERENCES

1 KazNIPImunaigas, «Sedimentologicheski analiz», Aktau 2022.

2 I.F. Glumov Y.P. Malovitsky A.A. Novikov B.V. Senin «Regionalnaya geologiya I neftegazonosonost Kaspiskogo morya». NedraBusinesstsentr LLC, Moscow, 2004 - 342 p

3 3. Chernova O.S. «Sedimentologiya rezervuara». Short Course Tutorial Tomsk, 2004, - 453 pp

4 Shakhawat Hossain «Application of seismic attribute analysis in fuvial seismic geomorphology» 3 December 2019

5 Gregory F. Ulmishek «Petroleum Geology and Resources of the North Ustyurt Basin, Kazakhstan and Uzbekistan»

6 S. I. Runkov «Paleogeograficheskie usloviya forvirovaniye I razvitiya»

7 L.V. Barsukov P.N. Laverov «Atlas litologo-paleogeograficheskih kart mira»

8 S.E.Krymkulov, A.M.Tastygaraev, M.M.Rymbayev, V.P.Tokarev, K.V.Vinogradova «Novye dannye o stroenii yurskoi produktivnoi tolshi mestorozhdeniya»

9 G. Nichols Sedimentology and Stratigraphy [Книга]. - [б.м.] : Wiley Blackwell, 2009

10 X Information Report – Sedimentology

11 Schlumberger, Introduction to Petrel, Houston: Schlumberger, 2016

Протокол

о проверке на наличие неавторизованных заимствований (плагиата)

Автор: Байниязова_ Перизат_Еркебұланқызы

Соавтор (если имеется):

Тип работы: Дипломная работа

Название работы: 2023_БАК_Байниязова_ Перизат_Еркебұланқызы.docx

Научный руководитель: Толганай Джарасова

Коэффициент Подобия 1: 2.1

Коэффициент Подобия 2: 0

Микропробелы: 6

Знаки из здругих алфавитов: 1

Интервалы: 0

Белые Знаки: 0

После проверки Отчета Подобия было сделано следующее заключение:

☑ Заимствования, выявленные в работе, является законным и не является плагиатом. Уровень подобия не превышает допустимого предела. Таким образом работа независима и принимается.

☐ Заимствование не является плагиатом, но превышено пороговое значение уровня подобия. Таким образом работа возвращается на доработку.

☐ Выявлены заимствования и плагиат или преднамеренные текстовые искажения (манипуляции), как предполагаемые попытки укрытия плагиата, которые делают работу противоречащей требованиям приложения 5 приказа 595 МОН РК, закону об авторских и смежных правах РК, а также кодексу этики и процедурам. Таким образом работа не принимается.

☐ Обоснование:

Дата *проверяющий эксперт*

31.05.23

Заимствования выявленные в работе не являются плагиатом.

Университеттің жүйе администраторы мен Академиялық мәселелер департаменті директорының ұқсастық есебіне талдау хаттамасы

Жүйе администраторы мен Академиялық мәселелер департаментінің директоры көрсетілген еңбекке қатысты дайындалған Плагиаттың алдын алу және анықтау жүйесінің толық ұқсастық есебімен танысқанын мәлімдейді:

Автор: Байниязова_ Перизат_Еркебұланқызы

Тақырыбы: 2023_БАК_Байниязова_ Перизат_Еркебұланқызы.docx

Жетекшісі: Толганай Джарасова

1-ұқсастық коэффициенті (30): 2.1

2-ұқсастық коэффициенті (5): 0

Дәйексөз (35): 0.2

Әріптерді ауыстыру: 1

Аралықтар: 0

Шағын кеңістіктер: 6

Ақ белгілер: 0

Ұқсастық есебін талдай отырып, Жүйе администраторы мен Академиялық мәселелер департаментінің директоры келесі шешімдерді мәлімдейді :

☑ Ғылыми еңбекте табылған ұқсастықтар плагиат болып есептелмейді. Осыған байланысты жұмыс өз бетінше жазылған болып санала отырып, қорғауға жіберіледі.

☐ Осы жұмыстағы ұқсастықтар плагиат болып есептелмейді, бірақ олардың шамадан тыс көптігі еңбектің құндылығына және автордың ғылыми жұмысты өзі жазғанына қатысты күмән тудырады. Осыған байланысты ұқсастықтарды шектеу мақсатында жұмыс қайта өңдеуге жіберілсін.

☐ Еңбекте анықталған ұқсастықтар жосықсыз және плагиаттың белгілері болып саналады немесе мәтіндері қасақана бұрмаланып плагиат белгілері жасырылған. Осыған байланысты жұмыс қорғауға жіберілмейді.

Негіздеме: Еңбекте табылған ұқсастықтар рұқсат берілген шектен аспайды

Күні

29.05.23

Кафедра меңгерушісі

Протокол

о проверке на наличие неавторизованных заимствований (плагиата)

Автор: Байниязова_ Перизат_Еркебұланқызы

Соавтор (если имеется):

Тип работы: Дипломная работа

Название работы: 2023_БАК_Байниязова_ Перизат_Еркебұланқызы.docx

Научный руководитель: Толганай Джарасова

Коэффициент Подобия 1: 2.1

Коэффициент Подобия 2: 0

Микропробелы: 6

Знаки из здругих алфавитов: 1

Интервалы: 0

Белые Знаки: 0

После проверки Отчета Подобия было сделано следующее заключение:

☑ Заимствования, выявленные в работе, является законным и не является плагиатом. Уровень подобия не превышает допустимого предела. Таким образом работа независима и принимается.

☐ Заимствование не является плагиатом, но превышено пороговое значение уровня подобия. Таким образом работа возвращается на доработку.

☐ Выявлены заимствования и плагиат или преднамеренные текстовые искажения (манипуляции), как предполагаемые попытки укрытия плагиата, которые делают работу противоречащей требованиям приложения 5 приказа 595 МОН РК, закону об авторских и смежных правах РК, а также кодексу этики и процедурам. Таким образом работа не принимается.

☐ Обоснование: Заимствования, выявленные в работе не превышают допустимого предела

Дата

31.05.23

Заведующий кафедрой

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РЕСПУБЛИКИ КАЗАХСТАН
Казахский национальный исследовательский технический университет
имени К. И. Сатпаева
Институт геологии и нефтегазового дела им. К. Турысова
Кафедра гидрогеологии, инженерной и нефтегазовой геологии

РЕЦЕНЗИЯ
на дипломную работу

Студент: Байниязова Перизат Еркебұланқызы

Специальность: 6В05202 – «Геология и разведка месторождений полезных ископаемых»

Тема дипломной работы: Геологическое строение, нефтегазоносность и палеогеографические условия формирования продуктивных горизонтов в Северо – Бузащинской нефтегазоносной области.

Данная дипломная работа посвящена изучению геологического строения, нефтегазоносности и палеогеографических условии формирования продуктивных горизонтов.

В дипломной работе представлены результаты седиментологического анализа по описанию керна скважин, сейсмические данные по литофациям и привязка керна к данным ГИС. Был проведен атрибутный анализ по сейсмическим данным и построение фациальной модели куба глинистости месторождения, так же определены палеогеографические условия по изучаемым горизонтам. Сделаны выводы и рекомендации по улучшению изученности скважин и горизонтов.

Дипломная работа, выполненная Байниязовой Перизат Еркебұланқызы на тему ««Геологическое строение, нефтегазоносность и палеогеографические условия формирования продуктивных горизонтов в Северо – Бузащинская нефтегазоносной области», является результатом самостоятельной работы и рекомендуется к защите. Данная работа оценивается на 98 баллов.

Рецензент

к.т.н., ассоц. проф. КОУ
«Геология нефти и газа»
Мурзатова С. К.

____
Подпись

«05» ___06___ 2023 г.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

K.I. Satbayev Kazakh National Research Technical University

K. Turyssov Geology and Oil-Gas Business Institute

Department of Hydrogeology, Engineering and Petroleum Geology

Perizat Y. Bainiyazova
(full name)

6B05202 – Geology and exploration of mineral deposits
(specialty)

Geological structure, oil and gas content and paleogeographic conditions for the formation of productive horizons in the North Buzachi oil and gas region
(topic of the diploma project)

diploma project on the topic

REVIEW

The first part of the thesis fully covers the general characteristics of the North Buzachi oil and gas region, geological stucture, lithological and stratigraphic characteristics and oil and gas potential. These sections are considered comprehensively, when writing works it is determined that they are written based on geological background data, and not only textbooks.

A special section of the thesis is designed to study the oil and gas content of the X field and the formation of productive horizons in paleogeographic conditions.

I propose to defend this thesis of Bainiyazova Perizat on the topic " Geological structure, oil and gas content and paleogeographic conditions for the formation of productive horizons in the North Buzachi oil and gas region".

Department of Hydrogeology
Engineering and Petroleum Geology
PhD, senior- lecturer T.S. Jarassova

«2» 06 2023 year

Метаданные

Название
2023_БАК_Байниязова_ Перизат_Еркебұланқызы.docx

Автор
Байниязова_ Перизат_Еркебұланқызы

Научный руководитель / Эксперт
Толганай Джарасова

Подразделение
ИГиНГД

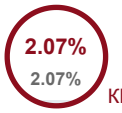
Список возможных попыток манипуляций с текстом

В этом разделе вы найдете информацию, касающуюся текстовых искажений. Эти искажения в тексте могут говорить о ВОЗМОЖНЫХ манипуляциях в тексте. Искажения в тексте могут носить преднамеренный характер, но чаще, характер технических ошибок при конвертации документа и его сохранении, поэтому мы рекомендуем вам подходить к анализу этого модуля со всей долей ответственности. В случае возникновения вопросов, просим обращаться в нашу службу поддержки.

Замена букв	ß	1
Интервалы	A→	0
Микропробелы	·	6
Белые знаки	ß	0
Парафразы (SmartMarks)	a	7

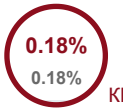
Объем найденных подобий

Обратите внимание!Высокие значения коэффициентов не означают плагиат. Отчет должен быть проанализирован экспертом.



КП1

КП2



КЦ

25
Длина фразы для коэффициента подобия 2

5015
Количество слов

31467
Количество символов

Подобия по списку источников

Просмотрите список и проанализируйте, в особенности, те фрагменты, которые превышают КП №2 (выделенные жирным шрифтом). Используйте ссылку «Обозначить фрагмент» и обратите внимание на то, являются ли выделенные фрагменты повторяющимися короткими фразами, разбросанными в документе (совпадающие сходства), многочисленными короткими фразами расположенные рядом друг с другом (парафразирование) или обширными фрагментами без указания источника ("криптоцитаты").

10 самых длинных фраз

Цвет текста

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ И АДРЕС ИСТОЧНИКА URL (НАЗВАНИЕ БАЗЫ)	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
1	Каспий маңы бассейнінің оңтүстік-шығысындағы тұз үсті шөгінділердің тектоникасы, мұнайгаздылығы және Шығыс Мақат кенорны бойынша қосымша барлау жобасы.docx [redacted] 4/26/2018 Satbayev University (ИГиНГД)	12	0.24 %
2	Каспий маңы бассейнінің оңтүстік-шығысындағы тұз үсті шөгінділердің тектоникасы, мұнайгаздылығы және Шығыс Мақат кенорны бойынша қосымша барлау жобасы.docx [redacted] 4/26/2018 Satbayev University (ИГиНГД)	9	0.18 %
3	http://www.kase.kz/files/emitters/KMGZ/kmgzf4_2017_en.pdf	9	0.18 %

4	5.08 Urmanova spe-manuscript-template-eng.docx [redacted] 8/6/2021 Satbayev University (ИГиНГД)	8	0.16 %
5	A Middle Jurassic Radiolarite-Clastic Succession from the Medvednica Mt. (NW Croatia) Špela Goričan,Josip Halamić, Tea Kolar-Jurkovšek, Damir Slovenec;	8	0.16 %
6	Тектоническое строение, нефтегазоносность и анализ физико-химических свойств и состава нефти и газа место-рождения Кара Арна [redacted] 5/19/2020 Satbayev University (ИГиНГД)	7	0.14 %
7	Каспий маңы бассейнінің оңтүстік-шығысындағы тұз үсті шөгінділердің тектоникасы, мұнайгаздылығы және Шығыс Мақат кенорны бойынша қосымша барлау жобасы.docx [redacted] 4/26/2018 Satbayev University (ИГиНГД)	7	0.14 %
8	http://www.hydrocarbons-technology.com/features/feature-the-worlds-biggest-natural-gas-reserves/	6	0.12 %
9	http://www.hydrocarbons-technology.com/features/feature-the-worlds-biggest-natural-gas-reserves/	6	0.12 %
10	http://www.kase.kz/files/emitters/KMGZ/kmgzf4_2017_en.pdf	6	0.12 %

из базы данных RefBooks (0.16 %)

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
Источник: Paperity			
1	A Middle Jurassic Radiolarite-Clastic Succession from the Medvednica Mt. (NW Croatia) Špela Goričan,Josip Halamić, Tea Kolar-Jurkovšek, Damir Slovenec;	8 (1)	0.16 %

из домашней базы данных (1.26 %)

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
1	Каспий маңы бассейнінің оңтүстік-шығысындағы тұз үсті шөгінділердің тектоникасы, мұнайгаздылығы және Шығыс Мақат кенорны бойынша қосымша барлау жобасы.docx [redacted] 4/26/2018 Satbayev University (ИГиНГД)	43 (6)	0.86 %
2	5.08 Urmanova spe-manuscript-template-eng.docx [redacted] 8/6/2021 Satbayev University (ИГиНГД)	13 (2)	0.26 %
3	Тектоническое строение, нефтегазоносность и анализ физико-химических свойств и состава нефти и газа место-рождения Кара Арна [redacted] 5/19/2020 Satbayev University (ИГиНГД)	7 (1)	0.14 %

из программы обмена базами данных (0.00 %)

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)

из интернета (0.66 %)

ПОРЯДКОВЫЙ НОМЕР	ИСТОЧНИК URL	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)

1	http://www.kase.kz/files/emitters/KMGZ/kmgzf4_2017_en.pdf	15 (2)	0.30 %
2	http://www.hydrocarbons-technology.com/features/feature-the-worlds-biggest-natural-gas-reserves/	12 (2)	0.24 %
3	http://geography.lnu.edu.ua/wp-content/uploads/2019/11/zbirnuk2019-problems-geomorfpaleogeogr.pdf	6 (1)	0.12 %

Список принятых фрагментов (нет принятых фрагментов)

ПОРЯДКОВЫЙ НОМЕР	СОДЕРЖАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)