

Integrated Reservoir Characterization and Petrophysical Assessment of the Kurra Chine Formation in the Peshkhabir Oil Field, Northern Iraq

Mahdi Khairi Aswad ^{1*} , Sazan Mohammed Ali ² 

mahdi.aswad@su.edu.krd

sazan.mohammed91@gmail.com

¹ Department of Earth Sciences and Petroleum, College of Science, University of Salahaddin -Erbil, Kurdistan Region, Iraq.

² Department of Civil Engineering, College of Engineering, Salahaddin University -Erbil, Kurdistan Region, Iraq.

* Correspondence author.

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Abstract

The Kurra Chine Formation, a Triassic unit, is a prominent unit in the subsurface of northern Iraq and a key target for hydrocarbon exploration because of its complex lithology and reservoir potential. However, few studies have fully characterized its petrophysical properties and reservoir quality, necessitating further investigation. This research aims to enhance understanding of the formation's hydrocarbon potential by conducting a comprehensive reservoir characterization and petrophysical evaluation at Peshkhabir Well-6 (PKH-6). To achieve this goal, an integrated approach was employed, combining wireline log interpretation, core sample analysis, and petrographic analysis. The total thickness of the formation is 546 m, with key reservoir intervals exhibiting an average shale volume of 9%. Lithologic analysis indicates dolomite, anhydrite, shale, limestone, and sandstone, with dolomite identified as the primary flow unit. Petrophysical evaluation indicates an average effective porosity of 6%, permeability reaching 24 mD, and average Water and hydrocarbon saturation of 21% and 79%, respectively. Petrographic observations confirmed hydrocarbon-filled pores, reinforcing the viability of the formation as a productive reservoir. These findings offer new insights into the reservoir quality, hydrocarbon distribution, and flow characteristics of the Kurra Chine Formation, contributing to improved exploration and field development strategies for Triassic reservoirs in northern Iraq.

Keywords:

Kurra Chine Formation, Northern Iraq, Peshkhabir Oil Field, Petrophysical and Reservoir Characterization

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1. Introduction

The Kurdistan region of northern Iraq is part of the prolific Zagros Fold Thrust Belt, which has numerous oil and gas fields. One of the key stratigraphic units within this region is the Kurra Chine Formation, which belongs to the Upper Triassic carbonate system in northern Iraq (Koshnaw et al., 2019). The Kurra Chine Formation is considered a complete petroleum system because it contains the key elements of reservoir, source, and cap rock. Evaluating the properties of carbonate reservoirs is essential for estimating hydrocarbon volume and improving reservoir management. Wireline logging remains widely used to address subsurface uncertainty,

providing quantitative petrophysical properties and lithological characteristics. Unlike clastic reservoirs, carbonate reservoirs are more complex, with significant reservoir heterogeneity in porosity and permeability arising from diagenetic processes and the distribution of clay minerals within reservoir units (Lucia, 2007).

In the reservoir and pay zones of northern Iraq, conditions such as high-volume water saturation necessitate detailed formation evaluation and petrophysical property analysis to identify the underlying causes of fluid volume changes (Aswad, 2020). Well-logging techniques, joined with petrographic interpretation and core sample analysis, enable the determination of reservoir quality and zone characteristics, as well

as subsurface formation characterization (Shalaby et al., 2023; Radwan et al., 2023). Additionally, advanced petrophysical tools and petrographic interpretation facilitate the identification of carbonate pore types and their relationships with reservoir quality (Teillet et al., 2021). Well logging tools play an important role in identifying hydrocarbon source rock and in reservoir description in drilled wells (Olorunniwo et al., 2019; Al Adwani, 2022). The Kurra Chine Formation, which comprises various carbonate

lithologies, has demonstrated prolific hydrocarbon potential in drilled wells in northern Iraq. Wetzel (1959) provided an initial description of this formation and highlighted its composition of limestone, papery shale, and dolomitic limestone with a maximum thickness of 834 m (Bellen et al., 1959). The Kurra Chine Formation is characterized by haematite in the lower part (Balaky and Tamar-Agh, 2017). Numerous studies have investigated this Formation (Table 1).

Table 1: Previous studies of the Kurra Chine Formation regarding the reservoir and hydrocarbon potential

Authors	Description
Sadooni (1995)	Studied the source rock of the Kurra Chine Formation and determined the main lithology
Ameri et al. (2009)	Identified kerogen types I and II, indicating maturation level within the Kurra Chine Formation
Aqrabi et al. (2010)	Divided the formation into four lithological units, including two carbonate units and two evaporite units
Al-Hamdani et al. (2019)	Evaluated the effects of diagenetic processes on porosity in multiple wells across northeastern Iraq
Edilbi et al. (2019)	Studied the level of maturation of the source rock of the Kurra Chine Formation
Lunn (2020)	Divided the formation into (A, B, and C) on the basis of sea level fluctuations and the maximum flooding surface.
Al-Dolaimy et al. (2021a)	Studied biomarkers of the Kurra Chine Formation, identifying pristine (pr) and phytane (ph) Pr/Ph ratios
Baban and Ahmed (2021)	Studied only unit A of the formation in the Shaikhan oil field
Al-Dolaimy et al. (2021b)	Studied pyrolysis analysis and indicated a low hydrocarbon generation potential
Al Dabagh et al. (2021a)	Studied the petrography and microfacies analysis of the Kurra Chine Formation to determine its depositional environment
Al Dabagh et al. (2021b)	Studied the effects of total and effective porosities on permeability in three wells,
Balaky et al. (2022)	Highlighted the heterogeneity of the shale units in a reservoir
Aswad et al. (2023a)	Examined the pyrolysis analysis of the Kurra Chine Formation in the Tawke Oil Field
Aswad et al. (2023b)	Examined the porosity types and petrography of the Kurra Chine Formation in the Tawke Oil Field
Aswad et al. (2024a)	Examined the palynofacies of the Kurra Chine Formation in the Tawke Oil Field
Aswad et al. (2024b)	Formation evaluation of the Kurra Chine Formation in the Tawke Oil Field
AL Khafaji et al., (2025)	Studied organic geochemistry and thermal history modeling Of the upper part of the Kurra Chine Formation from Butmah-15 well, northwestern Iraq
Aswad (2025)	Studied the source rock evaluation of the Kurra Chine Formation

2. Aim of study

The Formation is the thickest Triassic unit in northern Iraq, and plays an important role in oil and gas exploration and production. Its complex lithology, comprising dolomite, anhydrite, shale, limestone, and sandstone, presents challenges for reservoir characterization and fluid distribution analysis. While previous studies have investigated formations in various oil fields, detailed petrophysical evaluation of Peshkhabir Well-6 (PKH-6), a significant well in the Peshkhabir Oil Field, is lacking. This study addresses this gap by conducting a comprehensive formation evaluation through wireline log interpretation, core sample analysis, and petrographic investigations. Unlike conventional studies that rely primarily on log-

based assessments, this research integrates quantitative analysis of porosity, permeability, and hydrocarbon saturation to determine reservoir quality and producibility.

The overall aim of this study is to evaluate the reservoir characteristics and hydrocarbon potential of the Kurra Chine Formation in Well PKH-6.

Specific Objectives

- To quantify the petrophysical properties (porosity, permeability, shale volume, and hydrocarbon saturation).
- To identify the primary reservoir flow zones and assess the dominance of dolomite as the main reservoir lithology.
- To evaluate hydrocarbon-filled porosity and confirm reservoir potential through petrographic evidence.

- To provide insights into regional hydrocarbon distribution within the Kurra Chine Formation to support future exploration strategies.

3. Location and Tectonic Setting of the Studied Area

The studied well is located in Zakho, within the Peshkhabir Oil Field, Northern Iraq. This study focuses on analyzing cuttings from Well-6 of the Peshkhabir Oil Field. The coordinates of the studied well are 37° 05' 04" N and 42° 31' 01" E (Fig. 1). Structurally, the study area lies within the highly folded zone and is part of the Taurus fold and thrust belt (Fig. 1b). Tectonic activity in this region is related to the collision between the Eurasian and Arabian plates, which produced a foreland basin. The foreland basin corresponds to the Zagros fold belt in Iraq (Aqravi, 1998). Tectonically, Iraq is located northeast of the Arabian plate, where ongoing convergence between the plates has shaped the regional geological features. The lower and upper parts of the Kurra Chine Formation are unconformable and conformable with the Baluti and Galikhana Formation, respectively (Balaky, 2022). The thickness of the Formation is 834 m at the type locality, and the main lithology includes limestone, thick-bedded dolomite, and brecciated clasts (Bellen, 1959).

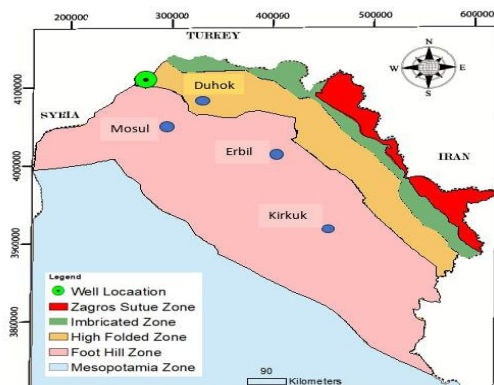


Fig.1: Location of the studied well and tectonic map of the studied area (after Edilbi et al., 2019).

4. Materials and Methods

Well Logging

Well- logging analysis was conducted using Tech-Log software to evaluate shale volume at different depths. The Well Logs were used to determine petrophysical properties.

Lithology was evaluated using the Neutron-Density (N-D) cross-plot method. **Shale volume:** According to Asquith and Krygowski (2004), shale volume in the reservoir can be rapidly estimated using Larionov and Linear GR methods

$$IGr = \{GR_{log} - GR_{min}\} / \{GR_{max} - GR_{min}\}$$

$$V_{sh} = 0.33 * (2^{IGR} - 1) \quad \text{Larionov method}$$

Porosity: - refers to the ratio of the pore volume to the bulk volume. According to Al-Dolaimy et al. (2021a),

Total porosity: N - D cross plots are used to determine porosity for the current study.

$$\phi_t = \{\phi_N + \phi_D\} / 2$$

Effective porosity: represents the interconnected pores and is calculated by $\phi_e = \phi_t * (1 - V_{sh})$.

Permeability: represents the ability of rock to pass through fluids. It was estimated from wireline logs using the Wyllie-Rose equation. $K = \{100 \phi^{2.25} / S_{wi}\}^2$

Water saturation is the fraction of the pore space filled with water.

Archie equation: applied in intervals less than 15% shale (Archie, 1942).

$$S_w = \{(F * R_w) / R_t\}^{1/n} \quad F = a / \phi_m$$

Simandoux equation (1963) is used for shale-rich zones, which contain more than 10% shale

$$S_w = \{(-V_{sh}/R_{sh}) + \sqrt{(V_{sh}/R_{sh})^2 + (4\phi_m/war_t)}\} / (2\phi_2/aR_w)$$

Hydrocarbon saturation (Sh): is crucial for hydrocarbon reservoir evaluations (Edilbi et al., 2019). Was calculated as. $Sh = 1 - S_w$

Movable hydrocarbon saturation: refers to the fraction of hydrocarbon that can be produced.

$$MHS = \{S_{xo} - S_w\} * \phi_e$$

Residual Hydrocarbon Saturation (RHS): represents the hydrocarbon trapped in the rock matrix. $RHS = (1 - S_{xo})$

Hydrocarbon index: defined as the ratio of movable to residual hydrocarbons, MHS/RHS . All abbreviations are mentioned in (Table 2).

Flow Zone Indicator (FZI): The FZI method (Porras and Campos, 2001) was used to categorize flow units with similar flow capacities. This approach enhances the understanding of reservoir quality and flow behavior, enabling the identification of zones with optimal productivity potential.

Core samples: Fifty core samples were taken from the Kurra Chine Formation. The lithology of core samples was described in the wellsite report and provided with a mud log. Conventional core analysis (CCA) was carried out on 50 core plugs by Emirates Link Reslab LCC in Abu Dhabi (UAE). Core samples were used to recognize the lithology and then used for petrographic descriptions (Fig. 2)

Petrography: Thirty-five thin section slides were prepared from core plugs of the Kurra Chine Formation.

These plugs were cut and oriented perpendicular to the bedding plane, then stained with Alizarin Red S (ARS) to distinguish calcite from dolomite, following the procedure of Friedman (1959).

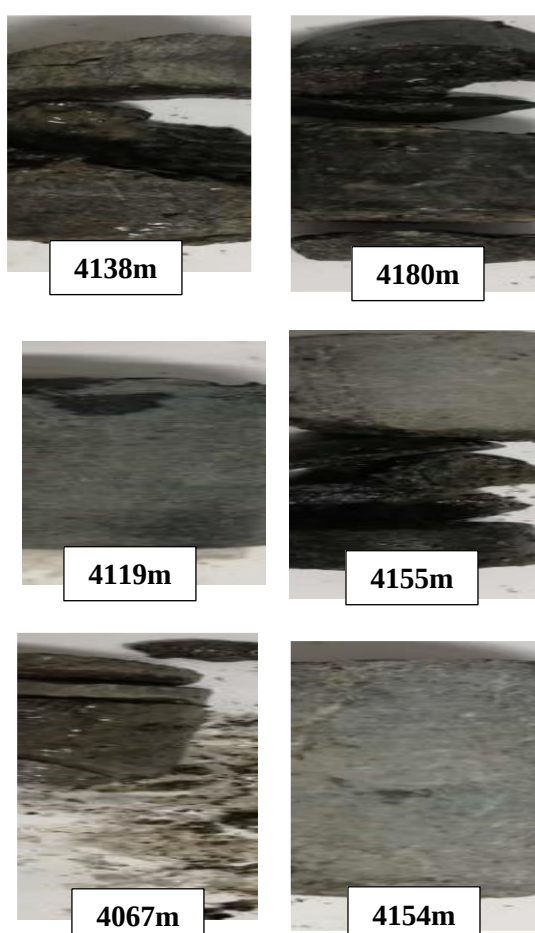


Fig. 2: Lithologic description of core samples indicates dolomite, fractures, veins, and fragments of anhydrite

Table 2: Abbreviations of the formulas were used in this study

Symb/Abbr	Description	Symb/Abbr	Description
IGR	Index Gamma Ray	Rw	Formation water resistivity
GRlog	Gamma-ray log value in zone of interest, API unit	Rt	True resistivity
GRmax	Gamma-ray log value in shaly bed, API	Rsh	Shale resistivity
GRcln	Gamma-ray value in clean zone, API	K	Permeability
Vsh	Volume of shale	Swi	Irreducible water saturation
ϕ_n	Neutron porosity	F	Formation factor
ϕ_t	Total porosity	Sw	Water saturation
ϕ_e	Effective porosity	MHS	Movable hydrocarbon saturation
Shc	Hydrocarbon saturation	RHS	Residual hydrocarbon saturation
a	Tortuosity factor = 1	Sxo	Flushed zone saturation
m	Cementation exponent = 2	n	Saturation exponent = 2

5. Results

Lithology

In this study, the lithology of the Kurra Chine was identified through an integrated analysis of wireline logging data, core samples and petrographic slides. The cross-plot lithology comprises dolomite, anhydrite, shale, limestone, and minor sandstones (Fig.3). Additionally, based on core samples, the main lithologies are dolomite, anhydrite, and shale. Further confirmation from petrographic analysis indicates that the dominant lithologies are dolomite, anhydrite, and shale.

Shale Volume

Shale volume is determined from Larionov (1969) formula. Shale volume varies from zone to zone. Overall, average shale volumes of the rock, reservoir, and pay zones are approximately 15%, 10%, and 9%, respectively (Table 3 and Fig. 4).

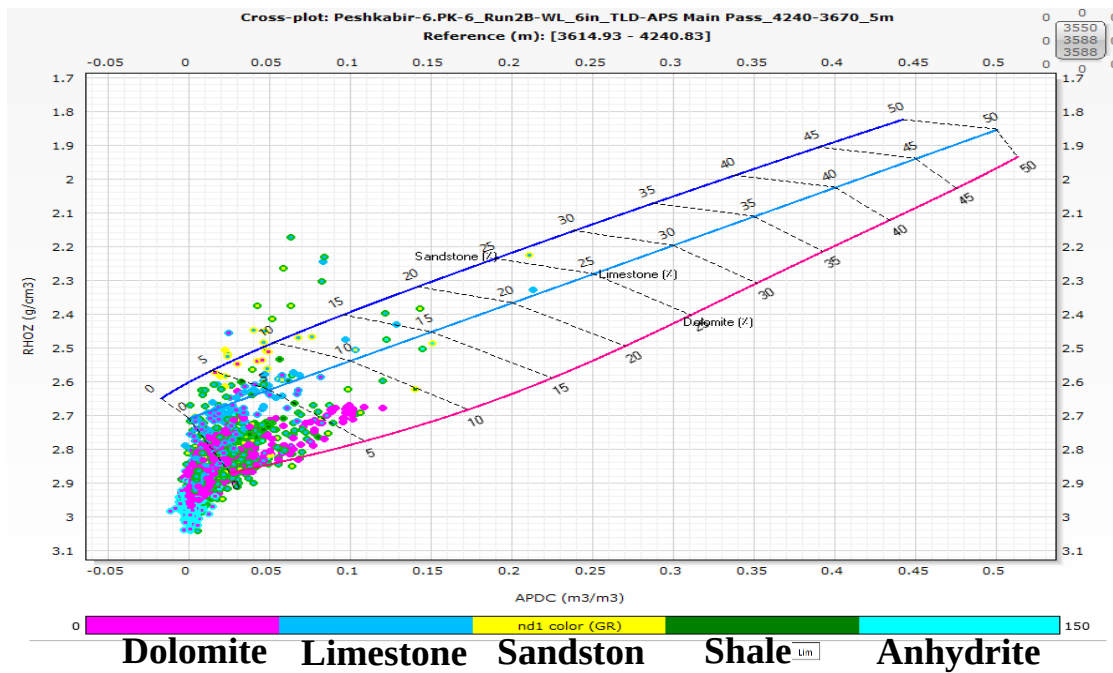


Fig. 3: Cross-plots of the parameters labeled N and D are used to identify the lithology of the Peshkhabir Oilfield. The description further explains that the bottom legend provides evidence for the lithology types shown in the figure, from left to right, namely, dolomite (pink), limestone (light blue), anhydrite (light), shale (green), and sandstone (yellow). These lithology types are the main ones found in the wireline logs

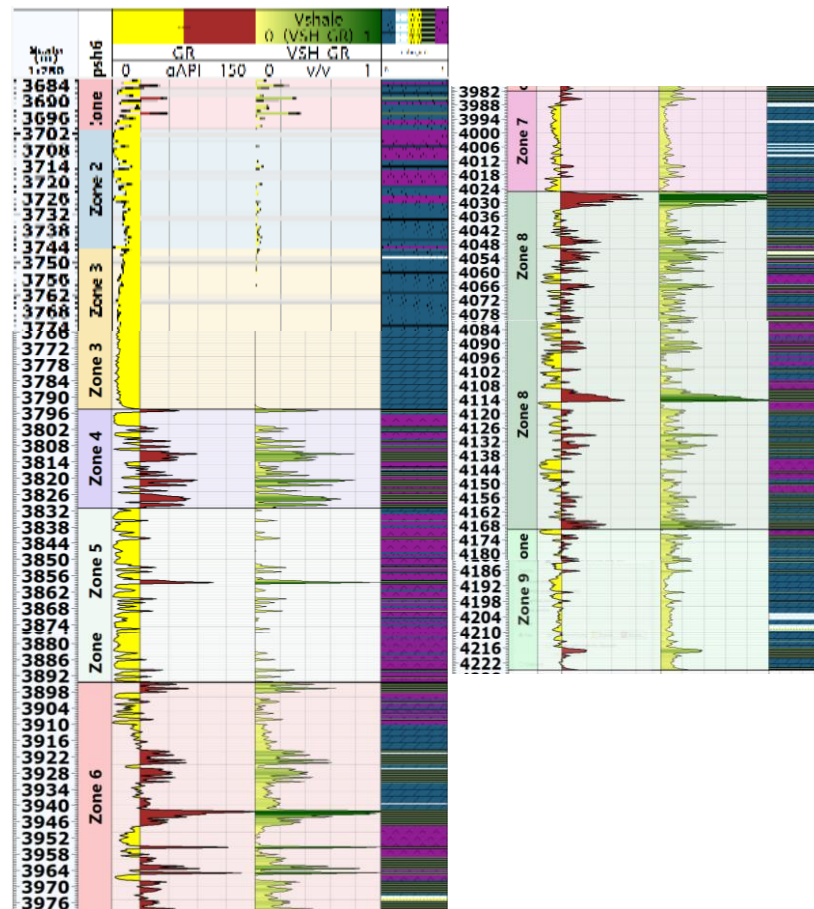


Fig. 4: The borehole depth, GR, and shale volume information from the Larionov method and stratigraphic column. The figure specifically highlights the presence of shale at different depths via the Larionov method at Peshkhabir Oil Field

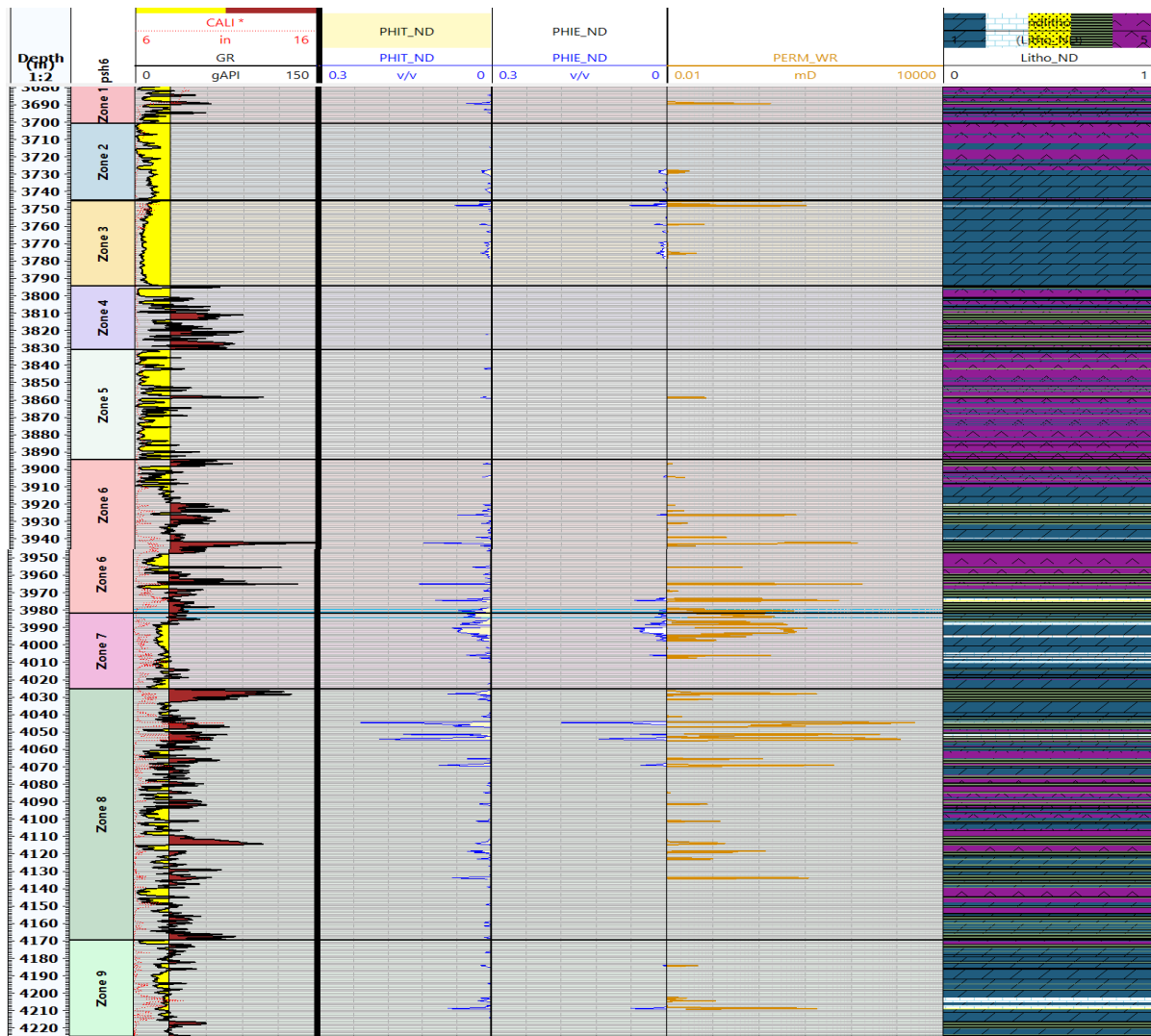


Fig. 5: N-D cross plots, density log (PHIE_D), sonic log (PHIE_S), and (PHIE_ND), data with a specific focus on measuring the effective porosity. The description addition

Porosity and Permeability

Porosity of the Kurra Chine varies significantly across zones and units, indicating low values at certain intervals. The higher total and effective porosity of the Kurra Chine Formation is 20% and 18%, respectively. Permeability also varies across depths and is controlled primarily by the pore- throat structure. The average porosity and permeability values for the rock, reservoir, and pay zones are approximately (0.013% and 13 mD), (0.014% and 1mD), and (0.046% and 24 mD), respectively (Table 3; Fig. 5).

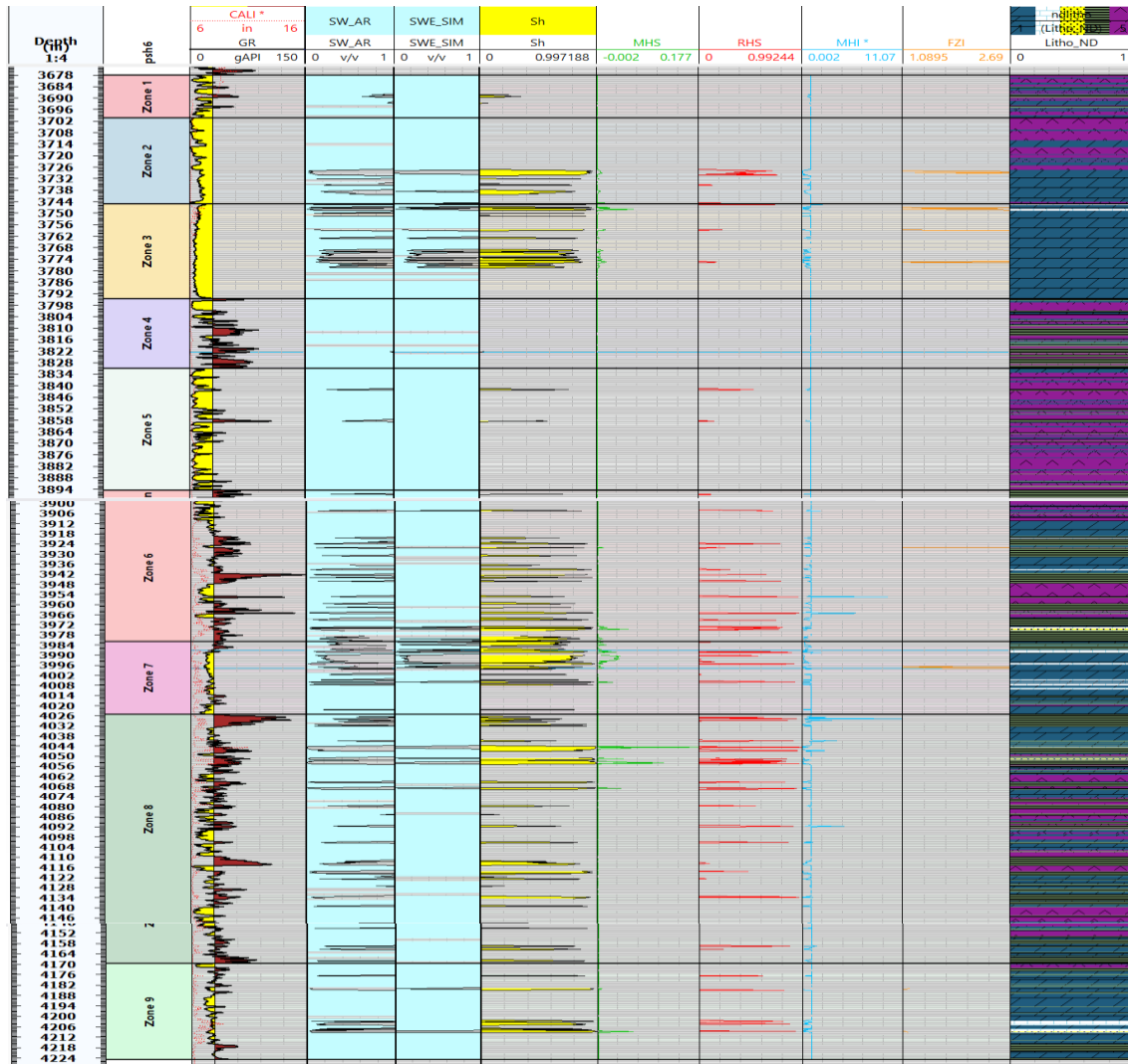


Fig. 6: Water saturation (S_w) volumes were determined via both Archie's and Simandoux equations. Moreover, it refers to hydrocarbon saturation (S_h), especially movable and residual hydrocarbon saturation. Additionally, the flow zone indicator (FZI) was used. The caption clarifies that the yellow, green, red, blue, and orange columns represent the hydrocarbon saturation.

Water and hydrocarbon saturation

The average water content within the formation is approximately 70%, whereas hydrocarbon content accounts for about 30%. The average values for movable and residual hydrocarbons, and flow zone indicators in these three zones are about 40%, 60%, and 90%, respectively (Fig. 6). Reservoir and pay zones. The gross thickness of the formation is 546 m, whereas the pay zone is only 58 m thick. This limited pay zone thickness is attributed to the influence of clay and anhydrite within the dolomite and reservoir units, which reduce the effective reservoir quality. Overall, the formation has low porosity and medium permeability. The main parameters of the net-to-gross ratio are explained in Fig. 7 and Table 3. Notably, dolomite is the only

lithology containing pay zones within the formation.

Net-to-gross and pay zones

Kurra Chine Formation is classified into rock, reservoir, and pay zones. The gross thickness of the formation is 546 m, whereas the pay zone is only 58 m thick. This limited pay zone thickness is attributed to the influence of clay and anhydrite within the dolomite and reservoir units, which reduce the effective reservoir quality.

Overall, the formation has low porosity and medium permeability. The main parameters of the net-to-gross ratio are explained in Fig. 7 and Table 3. Notably, dolomite is the only lithology containing pay zones within the formation.

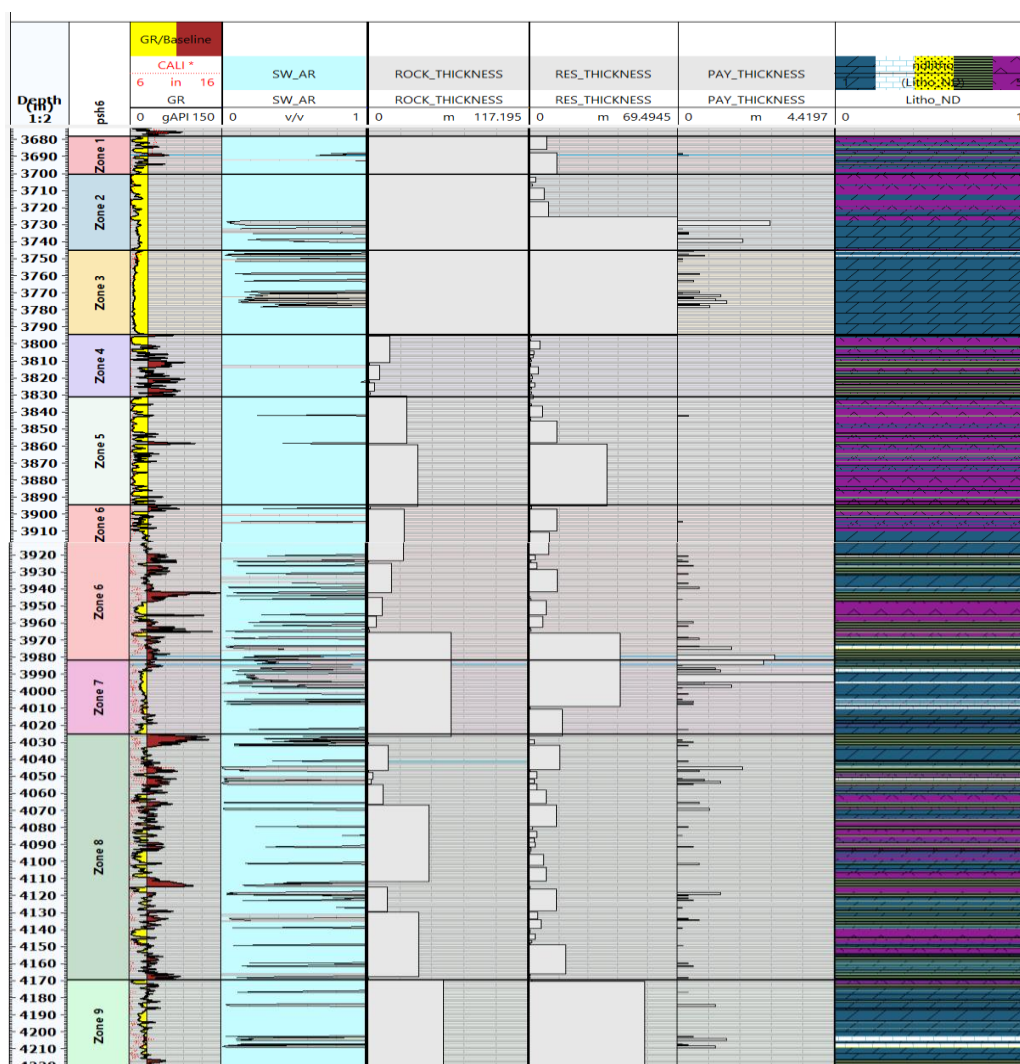


Fig. 7: Rock thickness, reservoir thickness, and pay thickness. This figure emphasizes the main reservoir thickness and pay thickness of the dolomite lithology. The figure provides information on the lithology associated with depth.

Table 3: Explanation of the parameters used for petrophysical properties

Flag names	Top (m)	Bottom (m)	Gross	Net	Not Net	NTG	AV. Sh %	AV. Ø%	AV. Sw %	AV. K mD
Rock	3678	4224	546	527	19	0.96	0.15	0.013	0.67	13
Res	3678	4224	546	500	47	0.91	0.10	0.014	0.67	15
Pay	3678	4224	546	58	468	0.106	0.09	0.046	0.21	24

Core samples and petrography

This section of slides represents the dolomite with high porosity and hydrocarbon content at some depths. Most pores in dolomite units are filled with hydrocarbons (Fig. 2). Core samples and petrographic analysis play important roles in identifying the porosity and lithology of the Kurra Chine Formation. Detailed information regarding the core plug and thin sections is presented in Table 4. Petrographic images of the Kurra Chine A carbonates reveal two significant findings: lithology identification and residual hydrocarbons occluding intercrystalline pores.

6. Discussion

The Kurra Chine Formation, located within the structurally active Taurus Fold Belt, is a key carbonate reservoir in the Kurdistan region. This formation has been shaped by complex tectonic events, including the collision between the Eurasian and Arabian plates, which created accommodation space for thick intervals of the Jurassic formations (Khoshnaw et al., 2019). The petrophysical analysis of Well PKH-6 provides insights into the reservoir quality and heterogeneity of the Kurra Chine Formation. The

lithology, shale volume, porosity, permeability, flow zone indicator, water and hydrocarbon saturations, and core and petrographic analysis of the Middle Triassic carbonate succession provide important insights into reservoir properties of the Kurra Chine Formation. The thickness of the formation varies slightly across different field and study areas. The thickness of the Formation at this Well is 540m. According to Bellen (1959), the lithology of this Formation is reported as limestone, shale, dolomite, and anhydrite.

The lithology of the Kurra Chine Formation in this field, based on the neutron–density cross–plot, was dolomite, anhydrite, shale, limestone, and minor sandstones. This lithology was emphasized by core samples and petrographic descriptions.

Shale volume was determined from Larionov's (1969) formula. The ratios of the Kurra Chine Formation in the Peshkhabir Oil Field differ. The clean zones are present, and most zones contain less than 60% shale, with the exception of Zone four, which is 8010 to 8030m. The Kurra Chine Formation comprises three shale-free zones, namely Zone 2, Zone 3, and Zone 5, which are identified as the main reservoir zones within the formation. In contrast, Zones 4, 6 and 8 present significant shale content, with average shale volumes of 60%, 40%, and 20% respectively. These shale zones are likely to serve as source rocks, potentially generating hydrocarbons that migrated to upper reservoir units. The overall average shale volumes of the rock, reservoir, and pay zones are approximately 15%, 10%, and 9%, respectively (Table 3 and Fig. 4). Total and effective porosity, for example, Zone 7 has total and effective porosities of approximately 9% and 6%, respectively. Most pores in this zone are filled with clay materials, which, along with anhydrite fragments, exert a significant influence on porosity reduction, with values of 20% and 18%, respectively. Permeability of the formation, anhydrite, and clay materials significantly influences the pore- throat geometry and fluid flow behavior. However, the dolomite units consistently display higher permeabilities across all the zones, with an average permeability of approximately 25 mD (Fig. 5). This highlights dolomite lithology as the key reservoir unit within the Kurra Chine. A comprehensive understanding of porosity and permeability is vital for active reservoir development and increasing production rate. Fluid

saturation of the formation, the pore size in these units are relatively small, the total hydrocarbon volume is modest, and the connectivity of the pores and the presence of open flow lines significantly influence fluid. This directly impacts the daily production rate, as the interconnected pore structure and open flow lines enable efficient hydrocarbon extraction from the reservoir. Hydrocarbons, both movable and residual, are mainly concentrated in the dolomite units (Fig. 6). The flow zone indicator (FZI) is associated primarily with dolomite units and is notably observed in zones two, three, and seven. This suggests that 40% of the hydrocarbons are movable and can flow within the reservoir. The FZI further indicates that flow lines within the dolomite units are open, facilitating hydrocarbon migration within the reservoir. Core descriptions, faults, and fractures significantly influence the reservoir quality of carbonate rocks by allowing greater capacities of fluids to be filtered and migrate upward (Gumati, 2024) (Fig. 8). These hydrocarbons are likely residual hydrocarbons, or more plausibly, bitumen. All the samples were subjected to chemical cleaning before conventional reservoir core analysis (RCA) was conducted. While most normal hydrocarbons were removed during this process, sticky and insoluble bitumen may have remained trapped in the samples. There are several potential explanations for the presence of residual hydrocarbons. This may represent residual oil left behind after hydrocarbon migration from the formation to another stratigraphic level. The residual oil was degraded over time, leaving behind black, sticky, bitumen-like substances. At one point, the Kurra Chine functioned as an oil-filled reservoir. However, subsequent geological events, seal breaches, or further structural development could have caused hydrocarbons to migrate to another part of the reservoir (Fig. 7). These findings highlight the complex history of hydrocarbon migration and trapping within the formation. Further details are illustrated in Fig. 9. The petrographic images from the Kurra Chine B carbonates reveal no traces of residual hydrocarbons or bitumen. All the intercrystalline pore spaces appear open, as shown by the blue stain in the images. These observations suggest several possibilities: the Kurra Chine B Formation may have never been charged with hydrocarbons or was not part of a hydrocarbon migration

pathway. Alternatively, the formation may have contained normal hydrocarbons that were successfully removed during the sample cleaning process. However, the test results indicate that no oil was present in this formation. This evidence supports the conclusion that the Kurra Chine B Formation likely played a minimal role in hydrocarbon accumulation or migration. A small

amount of preserved vuggy and fracture porosity. The pores have been partly occluded by anhydrite (A) and dolomite (arrow). (d) Dolostone (D) with a small amount of preserved intercrystalline porosity (blue stain). (e) Dolostone (D) with small amount of preserved vuggy and fracture porosity (Fig. 9).

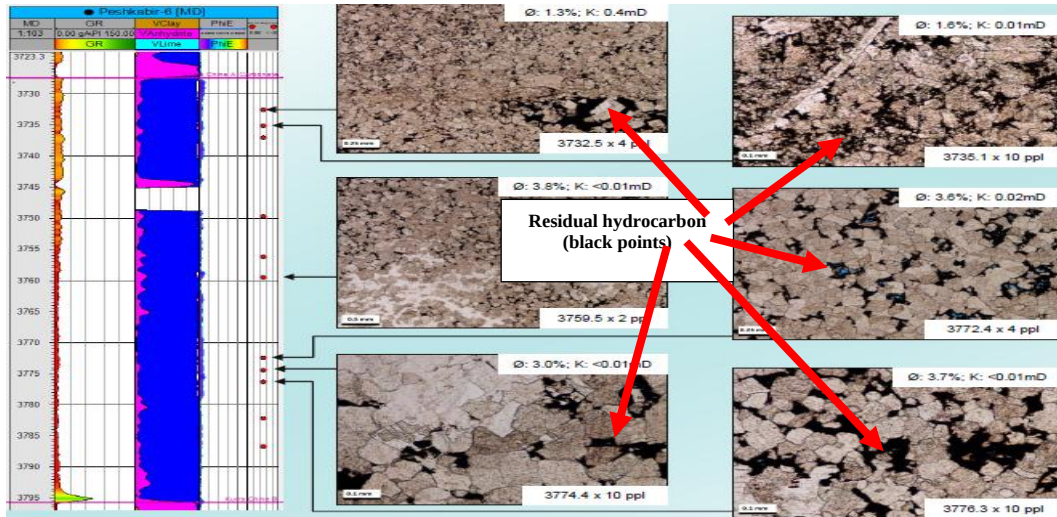


Fig. 8: Photomicrographs under plane polarizers of 10ppl and 4ppl. Shows the dolomite pores, and is filled with hydrocarbons. The petrographic images from the Kurra Chine A Carbonates have two things in common: the lithology of the Kurra Chine Formation and common residual hydrocarbons, which occlude almost all the intercrystalline pores.

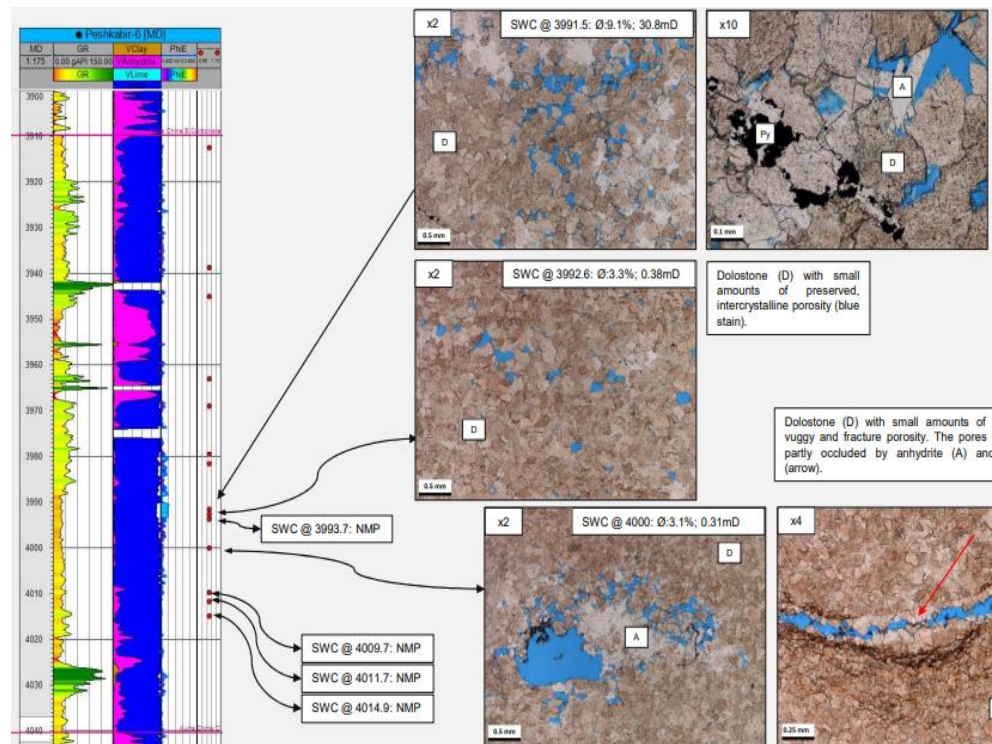


Fig. 9: (a) Dolostone (D) with common anhydrite cement (A) and small amounts of pyrite. Intercrystalline pores are present but are partly occluded by cement. (b) Dolostone (D) with a small amount of preserved intercrystalline porosity (blue stain). (c) Dolostone (D) with a long vein. (d) Dolostone with intercrystalline porosity. (e) Dolostone with vugs and fractures

Table 4: Depth of the core plug numbers and thin section slides of the Kurra Chine Formation

Formation	Well No.	Depth	Thin section	Core Plug No.
Kurra Chine	PKH-6	3732.5	2	
		3735.1	2	
		3737	1	
		3749.7		
		3756.2	2	
		3759.5	2	
		3772.4	1	
		3774.4	2	
		3776.3	2	
		3782.2		
		3786.7	2	
		3811.3	1	
		3822.7	1	
		3825	1	
		3826.1		
		3895.7		
		3912.5		
		3938.7		
		3945		
		3963	2	
		3969		
		3979.5	2	
		3981.6	1	
		3991.5	2	
		3992.6	1	
		3993.7		
		4000	2	
		4009.7		
		411.7		
		4014.9		
		4052.7		
		4067.6	2	
		4073.3		
		4084.6		
		4091.4		
		4099.7		
		4112	1	
		4119		
		4128		
		4131.4		
		4138.6		
		4154.5	1	
		4155.4	2	
		4180.4		
		4199.8		
		4206		
		4220		

7. Conclusions

This study provides a comprehensive analysis of the petrophysical properties of the Kurra Chine Formation at Peshkhabir Well-6 (PKH-6), offering new insights into reservoir quality and hydrocarbon distribution. The integration of wireline logs, core sample analysis, and petrographic investigations has enabled a more detailed assessment of porosity, permeability, and hydrocarbon saturation than previously available methods.

Key findings include the following:

- The total formation thickness is 546 m, with pay zones averaging 9% shale volume.
- Dolomite was identified as the primary reservoir lithology and flow zone, with a regular permeability of 24 mD and a porosity of 6%.
- The average hydrocarbon saturation was 79%, confirming the formation's economic potential.
- Petrographic analysis confirmed the hydrocarbon-filled porosity, reinforcing the importance of the dolomite reservoir.

The novelty of this research lies in its integrated petrophysical evaluation approach,

which improves reservoir characterization accuracy and exploration efficiency. These findings provide valuable data for future field development, reservoir modeling, and hydrocarbon production strategies in the Triassic formations of northern Iraq.

8. Acknowledgements

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9. Conflict of Interest

The authors confirm that there are no financial or personal conflicts of interest that could have influenced the outcomes presented in this paper.

10. Funding Statement

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التوصيف المتكامل للمكمن والتقييم البتروفيزيائي لتكوين كُزّا تشين في حقل بيشكخابور

النفطي، شمال العراق

مهدى خيرى أسود¹ ، سazan محمد على²

sazan.mohammed91@gmail.com

Mahdi.aswad@su.edu.krd

¹ قسم علوم الارض و النفط، كلية علوم، جامعة صلاح الدين، اربيل، العراق.

² قسم الهندسة المدنية، كلية الهندسة، جامعة صلاح الدين، اربيل، العراق.

* الباحث المراسل.

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الملخص

تكوين كورا تشين، الذي يعود إلى العصر الترياسي، يُعد من الوحدات البارزة في الطبقات تحت سطحية في شمالي العراق، يعد هدفًا رئيسيًا لاستكشاف الهيدروكربونات بسبب تعقيد ليثولوجيته وإمكاناته كمكمن. ومع ذلك، فإن عددًا قليلًا من الدراسات قد قامت بوصف خواصه البتروفيزيائية وجودة المكمن بشكل كامل، مما يستدعي إجراء المزيد من البحوث. يهدف هذا البحث إلى تعزيز فهم الإمكانيات الهيدروكربونية للتكوين من خلال تنفيذ تصنيف مكمني شامل وتقييم بتروفيزيائي في بئر بيشخابور رقم 6 (PKH-6). ولتحقيق هذا الهدف، تم اعتماد نهج تكاملي يجمع بين تفسير سجلات الآبار السلكية، وتحليل عينات اللباب، والتحليلات البتروغرافية. تم تحديد السماكة الكلية للتكوين بـ 546 مترًا، حيث أظهرت الفواصل المكمنية الرئيسية متوسط حجم طمي يبلغ 9%. وكشف التحليل الصخاري عن وجود مكونات من الدولومايت، والأنهيدرايت، والطين الصفحي، والحجر الجيري، والحجر الرملي، مع تحديد الدولومايت بوصفه الوحدة الأساسية لتدفق الموائع. وأظهر التحليل البتروفيزيائي متوسط مسامية كلية وفعالة تبلغ 6%، ونفاذية تصل إلى 24 ملليدارسي، ومتوسط تشبع هيدروكربوني يبلغ 79%. وأكدت الملاحظات البتروغرافية وجود مسامات مملوءة بالهيدروكربونات، مما يعزز من صلاحية التكوين كمكمن منتج. توفر هذه النتائج رؤى جديدة حول جودة المكمن، وتوزيع الهيدروكربونات، وخصائص التدفق في تكوين كورا تشين، مما يساهم في تحسين استراتيجيات الاستكشاف وتطوير الحقول للمكامن الثلاثية في شمال العراق.

الكلمات المفتاحية:

كوين كورا تشين، شمال العراق، حقل نفط بيشكخابور، التوصيف البتروفيزيائي وتوصيف المكمن

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