УДК 553.98.061.4.053065:551.735.1](477)

A.A. Kitchka, S.G. Vakarchuk, T.E. Dovzhok, R.O.Gavrylyuk

EXPLORATION OPPORTUNITIES OF THE TECTONICALLY INDUCED MISSISSIPPIAN HYDROTHERMAL DOLOMITE RESERVOIRS IN THE DNIEPER-DONETS BASIN

Exploration for oil and gas in the Lower Carboniferous (Mississippian) Carbonate Platform of Tournaisian - Early Visean age in the Dnieper-Donets basin (DDB) meets in many cases with particular problems caused by lack of detail knowledge about the spatial reservoir morphology and origin of the carbonate reservoirs. Application of the Trenton-Black River exploration play concept based on searching for structurally-controlled hydrothermal dolomite reservoirs (HTD) helps to solve the above task. Complex multistage hydrocarbon prospects in the Tournaisian - Lower Visean carbonate platform combining reservoirs of biohermal/reefal bodies, massive limestones with intense intraformational fracturing ("Mississippi lime" type), clastic and karstified rocks of the erosional residuum at intra-Visean unconformity («Mississippi chat» type), and structurally-controlled hydrothermal dolomites ("Trenton - Black River" type) are indentified in this study and create new promising exploration trend in the DDB. New strategy will shift exploration focus from limited portfolio of anticline and reefal traps to tectonically disturbed peripheral areas and monocline slopes of local depressions in the margin zones of the DDB paleorift thus extending its exploration life.

Key words: hydrothermal dolomite reservoir, Dnieper-Donets basin, Mississippian, hydrocarbons, fault tectonics

Introduction. Exploration for oil and gas in the Lower Carboniferous Carbonate Platform of Tournaisian - Early Visean (Lower Mississippian or Dinantian) age in the Dnieper-Donets basin – DDB (Fig.1) meets with particular problems caused by lack of detail knowledge about the spatial reservoir morphology and origin of carbonate reservoirs [1]. Employing of standard models for anticline or even biohermal traps gave much less hydrocarbon discoveries that explorers expected. Nevertheless, while exploring these carbonates there was obtained many oil and gas sub-commercial flow rates and numerous manifestations testifying petroleum potential of this formation. At first sight there is no regularity in localization of rocks with improved reservoir properties – fractured limestones and saddle dolomites - within known fields. However, our study proves there is a solution to solve the puzzle. The analogy with structurally-controlled hydrothermal dolomite (HTD) reservoirs [2] responsible, for instance, for the prolific hydrocarbon trends like Indiana-Lima and Albion-Scipio in the Appalachian basin, led to success. Other bright examples of the hydrothermal brines impact onto carbonate host rocks to produce excellent reservoirs are highly productive rim of Tengiz giant oil field [3], prolific Cogollo Group carbonates in the Maracaibo basin, Pinda Formation offshore Angola, Natikh E reservoir with up to 40% porosity at Al Ghubar oil field, Oman. It commonly occurs around transtensional faults which when active are conduits for hydrothermal fluids which evolve over time and can produce a range of mineralization and dissolution.

Porosity in both limestone and dolomite reservoirs can be created and enhanced by fault-sourced hydrothermal fluids. This dissolution of the calcite is therefore of a subsurface origin. Most of the porosity in some cores and thin sections is of a leached dolomite origin. The fact that the leaching occurred after this high temperature dolomitization confirms a subsurface origin. Hydrothermal fluids rich in H_2S are interpreted to have flowed up active faults and into the formation where theywere oxidized to create sulfuric acid which did the dissolution. Pyrite and anhydrite precipitation closely follow the dolomite dissolution. This all occurred during early burial prior to oil migration. In the Cogollo Limestone of Venezuela, there is burial corrosion of limestone reservoirs interpreted to have occurred along strike-slip faults known to have been active during early burial of the formation [4]. The corrosion clearly postdates early near-surface diagnesis which is largely cementation and is followed but relatively high temperature dolomite,

calcite, and kaolinite (dickite) precipitation. There would not be a reservoir without this burial corrosion and as a result it is important to drill wells near the faults that were the source for the diagenetic fluids. At least three factors make fault-sourced hydrothermal fluids capable of corrosion of limestone: progressive cooling of the fluids, elevated salinity, and increased CO_2 in solution. Calcite and CO_2 both have retrograde solubility so as fluids cool they become progressively undersaturated and progressively more acidic. pH generally decreases as salinity increases so hypersaline brines coming up faults should be capable of leaching limestone. Burial corrosion of limestone and dolomite also occur in many other carbonate reservoirs. It can commonly be linked to faults (typically strike slip or transtensional faults) and might therefore be predictable in cases where good seismic data is integrated with good core and petrographic data.

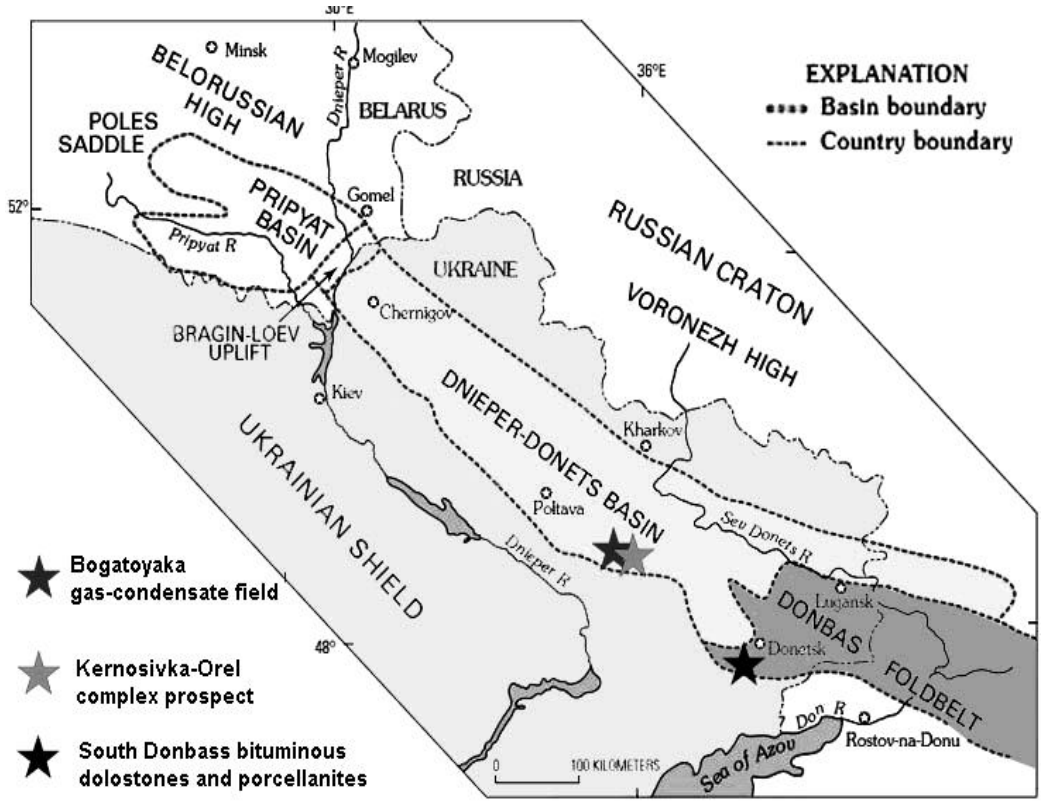

Fig. 1 Location of the DBB and Donbas Foldbelt, stars indicate HTD reservoirs in the Lower Carboniferous carbonate platform

Trenton-Black River type reservoirs in context of the DDB structure and exploration potential

The Trenton-Black River hydrothermal reservoirs were described at the first time for the Appalachian, Michigan, Midcontinent basins etc. in North America. [5]. Nowadays, this model is widely recognized and applied worldwide for many basins with carbonate reservoirs (Fig. 2).

For the DDB this model has come from comparison of geophysical and production well data on Bogatoyka field with structure and lithological varieties of Lower Carboniferous carbonates observed and studied in natural outcrops and flux dolomites quarries on the south of the Donets Foldbelt [7]. This allowed tracing of stratigraphy and lateral changing of modeled object and making ground truth verification of seismic attributive analysis data. Bogatoyka gas condensate

field, which is located in the south-central part of the DDB (Fig. 1), was a case study to feature its carbonate reservoir heterogeneity and origin.

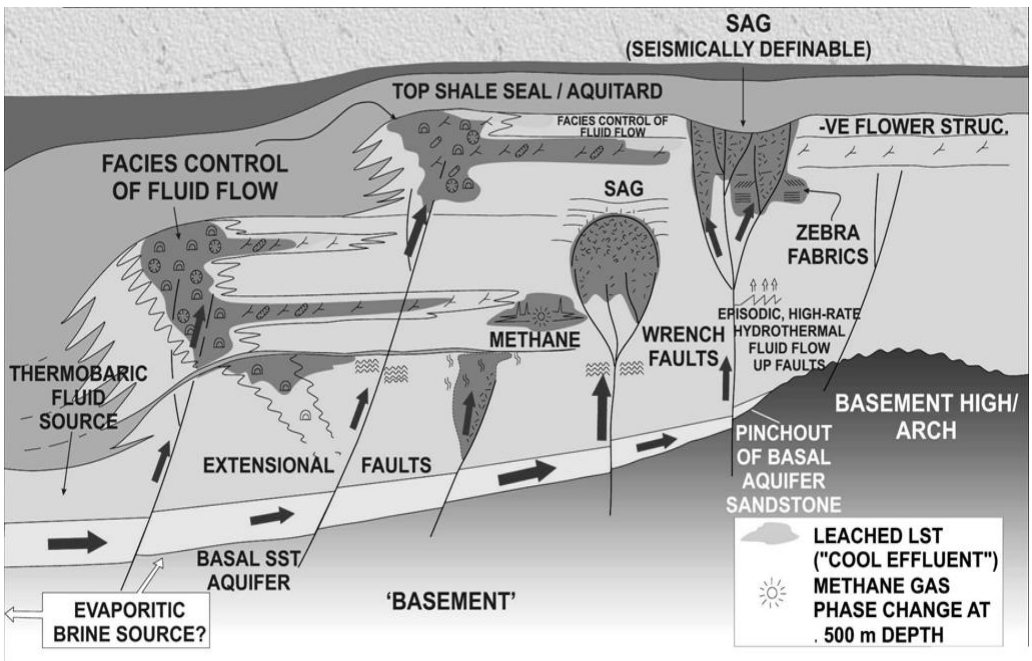

Fig. 2 Variety of HTD reservoirs in Devonian of Western Canada, emplacement control for thermobaric dolomite, [6] (after Graham Davies model [2])

Geophysical exploration and model interpretation derived from Bogatoyka gas-condensate field

TBR model explains an absence of commercial production in wells located in the central parts of fractured and leached reservoir rocks by presence of brecciated clayey karst cones along ascending paths of hydrothermal fluids. Dolomite leaching occurred in fractures vugs and matrix, so presence of leaching in fractures suggests fluids flowed up faults and fractures and into matrix. Comparison of these zones with available well-testing data (as for commercially productive as non-productive ones) has produced an idea about geological model of the secondary carbonate reservoir in Bogatoyka that similar to TBR, which is known as tectonically-induced hydrothermally transformed carbonates (limestones into dolomites).

An integrated interpretation of 3D seismic and gravity data revealed zones of decreased density carbonate sequences (4000-5000 m depth) that is in good coincidence with location of productive wells. Computation of time-spatial dispersion of seismic energy gave us a possibility to visualize seismic heterogeneity of the section expressed by decreased dispersion comparing to the surrounding rocks [8]. It was found that low impermeable paleo-venting channels are rimmed with variable porous “saddlerized” dolomites and fractured and leached limestone. An example of HTD complex exploration prospect, just to the east of Bogatoyka is shown on Fig. 3.

Oil manifestations in the Folded Donbas and analog outcrops study

To the east, it was studied dolomitization and fracture patterns along with distribution of bitumen impregnation (Fig. 4) upon the Styla suite, an analog of the Mississippian chat reservoir [9], accompanied by hypogenic karstification (Figs. 5-7) in the Central and other quarries working for flux dolomites in the Southern Donbas. It is ought to mention that secondary dolomitization there is associated with Mississippi Valley type sulfide mineralization (MVT).

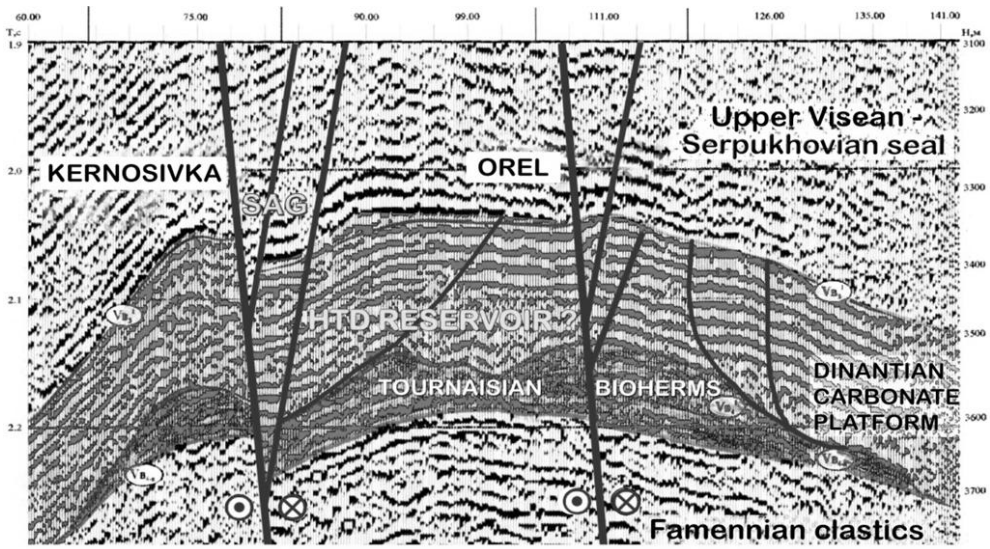

Fig. 3 Combined trap of the Kernosivka-Orel prospect, Tournaisian biohermal + HTD reservoirs governed by a pair of sinistral strike-slip faults along terrain

In general, the form of bitumen occurrences mimics the folds affecting the host rocks and shows various, sometimes very spectacular forms of deformed lenses, bed-parallel seams, nests, and mushroom-like bodies up to 12 m high and 30 m wide. It was found unusual fluorescence of the bitumen, which can be interpreted as deeply altered «dead» oil in the reservoir rocks of the suite.

The bitumen impregnation sites were found in the Zapadny and Vostochny quarries during the fieldwork carried out in the frame of INTAS 97-0743 Project in 2000. Later in June 2002 it was also studied character and distribution of bitumen impregnation in the Styla and Central quarries of the Dokouchaevsk Flux-Dolomite Production Enterprise. It should be mentioned that first description and analysis of migration bitumens (anthraxolites) upon fractures of the Lower Carboniferous limestones near Karakouba village (now Rozdolne) have been done by the research group headed by V.B. Porfiriev [10].

This particular series of flyshoid beds drastically differs from other ones of the Lower Carboniferous Massive Limestones in the SW Donbas by its peculiar lithology, appearance, and very spectacular fold structures. The suite is subdivided onto two units, and only the lower one so-called “Lower Visean E_1” [11], of 50 m thick, is subjected by fine folding. In the adjacent Dnieper Basin the Stylian suite is roughly corresponded to the Rudovka beds differing from other rocks of the section by high concentration of uranium and REE and substantial enrichment in organic matter content of sapropelic type. In that basin the above beds contain economically viable reservoirs [12, 13] revealing very similar genetic features to known Mississippi-chat reservoirs of the Midcontinent in USA [3]. Reportedly to previous studies some unusual rocks, called meta-bentonites, have been found in the section. V.I. Poletaev and S.A. Matchoulina [14] have found and described those white, yellowish-off-white clayey rocks which are in fact a deeply altered volcanic ash material, a product of sub-marine weathering (halmyrolysis).

In general, six lithological types compose the suite within the area studied. Silicified and bleached slaty marls intercalated with aphanic ribbon cherts with seams of meta-bentonites dominate in the succession, and there are sporadically occurred immature silts and sandstones, secondary barren and bituminous porcelanites (tripolites), and finally, bedded phosphorites were recently found there [15]. In some localities underlying beds of massive Visean and Tournaisian cryptocrystalline limestones are totally or patchy converted to dolostones in the vicinity of dykes and stocks of Permian age. It also should be mentioned a sporadic pyritization of the early

Carboniferous carbonates and even manifestations of Mississippi-valley type mineralization like in the Styla quarry.

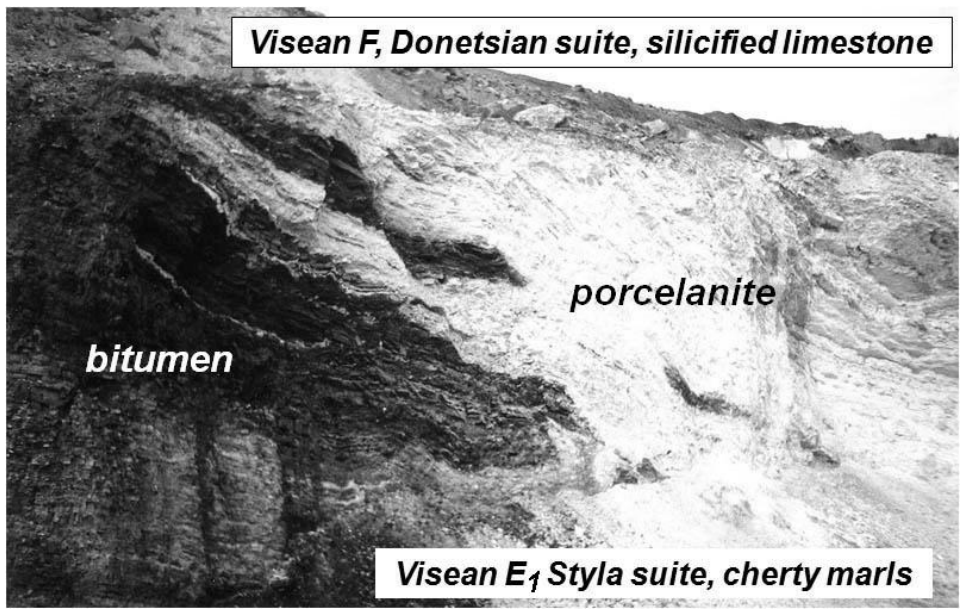

Fig. 4 Flame-like bitumen impregnation front into the bleached and porous cherty marls and thin-laminated clastics at the intra-Visean unconformity, Zapadny dolomite quarry, Southern Donbas

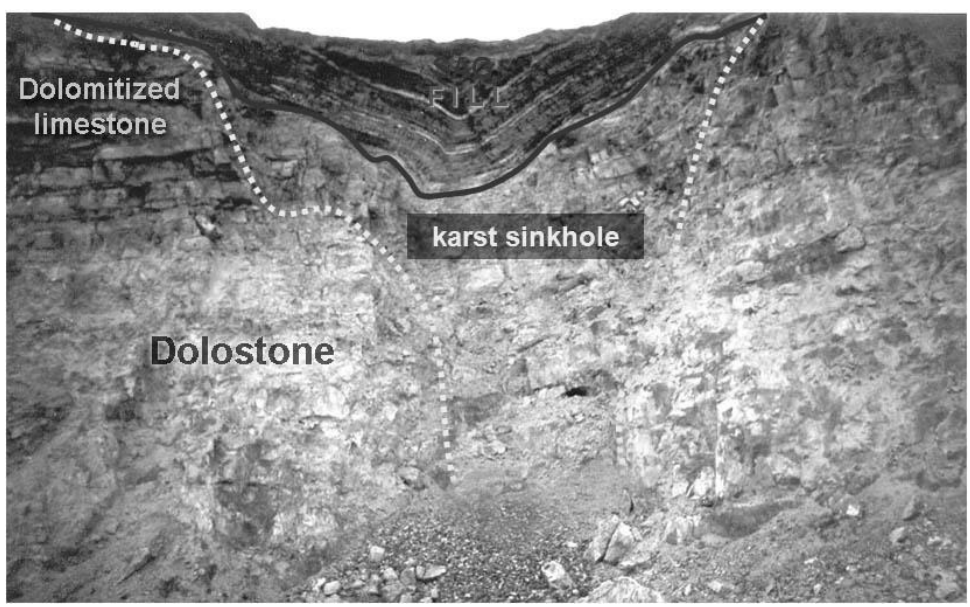

Fig. 5 Buried karst sinkhole upon the Lower Visean carbonates, Central quarry, Southern Donbas

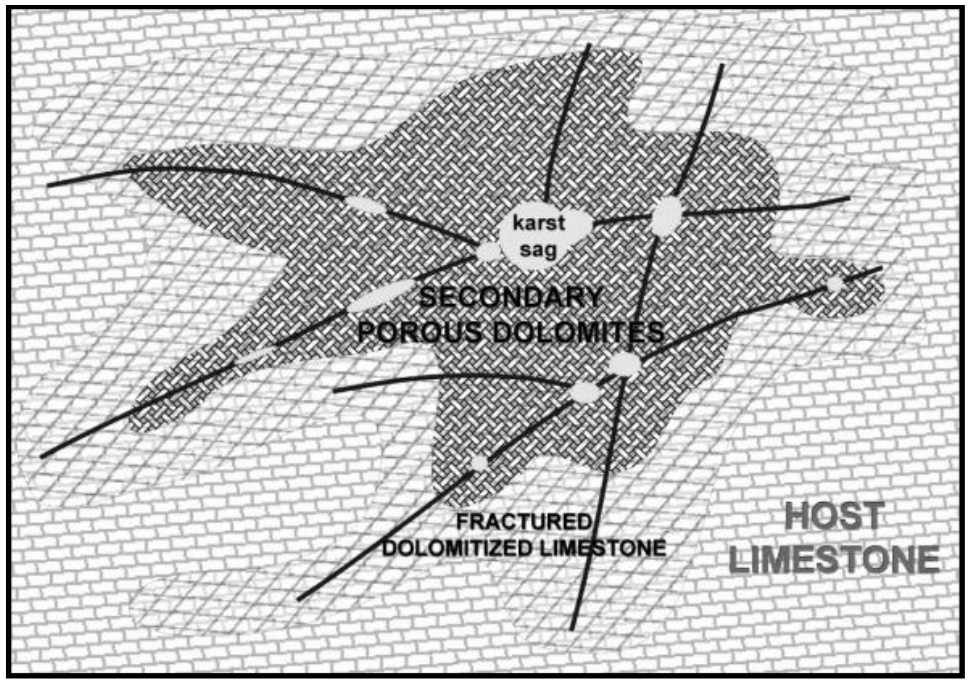

Fig. 6 An idealized horizontal slice of HTD reservoir rocks cluster. Note that venting system of hypogenic or «upward» karstification are usually filled tight collapse breccia and surrounded with tight saddle dolostone

The folds under consideration are typical mesoscopic ones. They are disharmonic (rarely polyharmonic) folds dying rapidly along axial surface; adjacent folds differ in terms of wavelength (from few decimeters to 50 m) amplitudes and symmetry typically due to variation in physical properties and layer thickness. They do not affect the overlying and underlying strata and strike mostly to the NW that differs from true tectonic ones of higher order. Folds are of multivarious form: box folds, fan-like, isoclinal, symmetric and asymmetric, upright, inclined, recumbent, and other ones. In places where true tectonic faults cross the Stylian suite its rocks are totally crushed, brecciated and altered (due to strong karstification) and those faults do not reveal any clear links to the abovementioned folds. Their features testify that the Stylian suite was subjected by submarine/subaerial slumping. Thus, it is proposed that folding of the Stylian suite was caused by local differential uplifting/subsidence and bed tilting triggering bed-parallel slip upon the unconformity surface and efficient deformation of the sedimentary succession contained soft, incompetent layers.

The tar mat samples collected in 2000 were provisionally described as “black shale” with high porosity and low density. It was very soft so it left black lines on paper like a charcoal. For detailed investigation MAFI (Geol. Inst. of Hungary) made elemental analysis for organic and inorganic components (Table. 1). Measurements have been carried out on ICP-OES and Fissions 1500 NA Elemental Analyser equipment.

Elemental composition acquired by Fissions Carlo Elbra 1500 is: N = 0,155 %; C = 4,675 %, where C content is equivalent to C_{org} %, because carbonate content is very low. H = 0,425 %; S = 0,17 %. Petrographically the sample shows complexity. The host material is a fine-grained silty bioclast with high porosity. Organic matter (OM) dominantly consists of bitumen (~ 75 –80 %). It was found unusual fluorescence of the bitumen, which can be interpreted as deeply altered “dead” oil in the reservoir rocks of the suite. The solid bitumen shows two features. Most part of the solid bitumen (Bitumen 1) has penetrated the host rock. It has diffuse brownish color, which surrounds sponge needles (30- 50 μm in diameter) or other siliciclastic detritus material. The other type has brighter gray color with slightly granular polished surface and fills the pores between quartz grains

and the silt material. Frequency of Bitumen 2 (< 5%) is rather less than Bitumen 1. The rest of the OM consists of vitrinite (~ 5-10 %) and bioclasts (algae?) (~ 10 %). Vitrinite has elongated form and its average size is from 10 to 30 μm. Bioclast periderm is usually visible in fragments in the sediment. Average diameter of the fragments is 25 x 10 μm. Whole bioclasts can be found in very thin walled small size (30 – 50 μm). Reflectivity of the different OM is different, but if we compare reflection data for bioclast and bitumen with vitrinite one equivalent values we get the same results (Table 1). Beside of vitrinite, a trifling content of inertinite (1 – 2 %) is detected. Thermal maturity of the sample is in the transition from wet gas zone to dry gas after the 1,5% vitrinite reflectance value, giving a room to speculate about the source of oil that filled the reservoir.

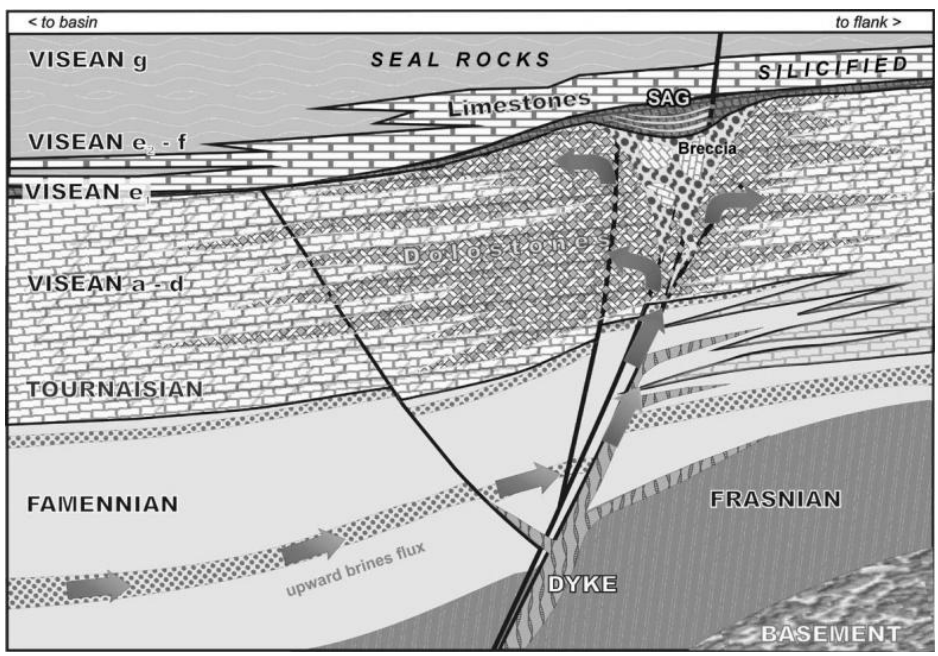

Fig. 7 Model of hydrothermal dolomite reservoir formation in the Lower Visean carbonates, Southern Donbas

Table 1

Thermal maturity measurements

Type	Mean value	*Minimum*	Maximum	Standard dev.	Total N	$R_{vit.eq.}$ %
Vitrinite	1,551	1,185	2,062	0,247	38	1,551
Bioclast	4,161	2,150	5,638	0,930	28	1,3 - 1,6
Bitumen	1,017	0,123	1,349	0,882	17	1,0 – 1,3

Within the Folded Donbas oil manifestations from coal seams and barren rocks like sandstones and limestones are known for years in coal mines. It is interesting that half of them are related to mined limestones like in the Krasnolimanska, Chaykino Deep, Chesnokova, Kadievska nos. 4-2-bis, and other ones. Because measured coalification ranks over the whole Donbas are too high to fit with oil generation window this paradox could be resolved by exploration drilling. Some HTD prospects targeting thermogenic gas (at least) entrapped in the underthrusted anticlines within the Southern Donbas are shown on Fig. 8 featuring DOBRE-1 transect [16].

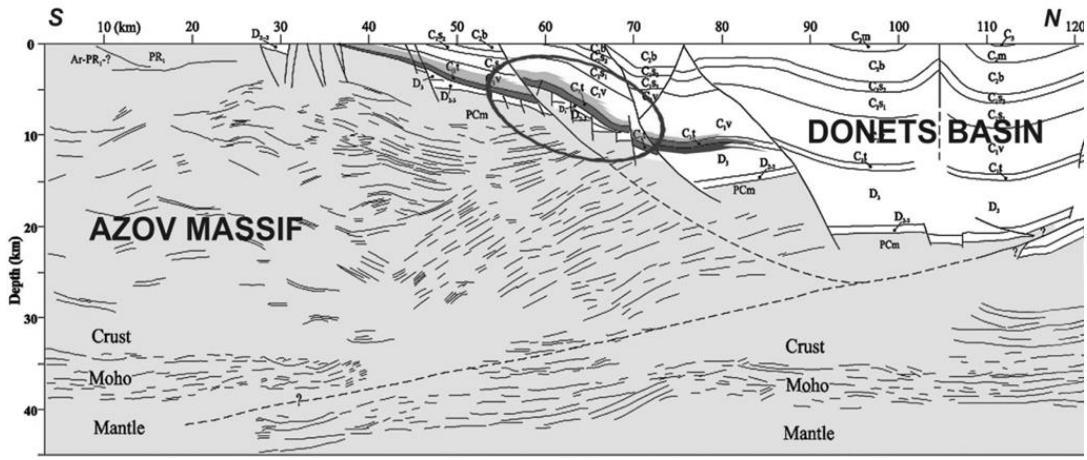

Fig. 8 Potential undertrhust HTD traps (circled) in the Southern zone of Donets Basin. Depth-converted DOBRE-2000 transect across the Folded Donbas, after Maystrenko et al., 2003, modified

Conclusions

1. Basement-rooted strike-slip faults provides pervasive vertical conduits for upward migration of hot brines and hydrocarbons because the stress ellipsoid stipulating wrench faulting favors to periodically opened network of vertical tension gashes through the whole sedimentary column till the seal surface. This process opens ways to redistribute laterally the formation waters overflow to produce secondary localized dolomitization and additional metasomatic and fractured porosity making prerequisites for prolific hydrocarbon HTD reservoirs/traps.
2. Several discovered to the date of oil and gas fields related to the secondary dolomite/fractured reservoirs, sub-commercial flow rates and numerous oil and gas manifestations while drilling through the Lower Mississippian carbonates, a spotty bituminization of the intra-Visean Styla suite speak in favor of validity of the Trenton – Black River reservoir model for the Lower Mississippian carbonate platform in the DDB.
3. An integrated 3D model for the carbonate reservoir of the Bogatoyka gas-condensate field based on joint inversion of seismic and gravity data and further development drilling has proved the validity of HTD reservoir model as well as and analog outcrop study and oil migration traces to the Visean carbonate section and bituminization in the Southern Donbas.
4. A quasi-equidistant system of transcurrent and along-terrain strike-slip faults in the DDB and Folded Donbas creates rather dense grid of fractured bands and their intersections (so-called fractured «knots») along with numerous seismically definable sags («pockmarks») in the flanks and marginal zones of the DDB paleorift stretched NW-SE in the Eastern Ukraine for 400 km. By now there are dozens of ready to explore HTD prospects, but total number of potential HTD traps in the DDB and underthrust zones in the Folded Donbas is much greater and could double (at least) reserves assessment for the Lower Carboniferous carbonate platform hydrocarbon potential. Application of HTD plays prospecting strategy will move exploration focus from anticline traps to tectonically disturbed peripheral areas and monocline slopes of local depressions in the margin zones of the DDB paleorift thus extending its exploration life.
5. Complex hydrocarbon prospects in the Tournaisian - Lower Visean carbonate platform combining biohermal/reefal bodies, fractured limestones («Mississippi lime» type), clastic rocks of the erosional residuum at intra-Visean unconformity («Mississippi chat» type), and structurally-controlled hydrothermal dolomites («Trenton – Black River» type) create new promising exploration trend in the DDB. Applying the rationale outlined above reveals, however, that such a complex prospect may to stipulate re-examination of the Mississippian carbonates core samples collected by NJSC Naftogaz of Ukraine, Ukrgasvydobuvannia AC, and Ukrnafta PJSC and to launch an extensive campaign to re-interpret old 2D seismic data as well as applying of horizontal

drilling with fracking for successful development. Such an approach to develop “combo” prospects will make unexplored carbonate plays in the DDB economically viable and attractive.

1. *Kitchka A.A., Vakarchuk S.G., Dovzhok T.E., Prykhodchenko O.E.* (2012). Hydrothermal Reservoirs - New Exploration Life for the Mississippian Carbonate Platform, the Dnieper-Donets Basin. *Ext. Abs. 75th EAGE Conf*., London, 4 p.
2. *Davies G.R., Smith Jr. L.B.* (2006). Structurally controlled hydrothermal dolomite reservoir facies: An overview. *AAPG Bulletin*, v. 90, no. 11, p. 1641-1690.
3. *Collins J.F., Katz D., Harris P.M., Narr W.* (2014). Burial Cementation and Dissolution in Carboniferous Slope Facies, Tengiz Field, Kazakhstan: Evidence for Hydrothermal Activity. *AAPG Search & Discovery Article*, no. 20234, 17 p.
4. *Smith T.* (2014) Subsurface Corrosion of Calcite and Dolomite by Fault-Sourced Hydrothermal Fluids. *AAPG Search & Discovery Article*, no. 20234, 17 p.
5. *Pyron A. et al.* (2002). Integrated exploration technologies model Trenton in western New York. *OGJ*, vol. 100, no. 37, p. 44-49.
6. *Grammer G.M. et al.* (2010). Stratigraphic Control on the Lateral Distribution of Hydrothermal Dolomites away from Major Fault Zones. *AAPG Search & Discovery Article*, no. 50277, 25 p.
7. *Kitchka A.A. et al.* (2003). Bitumen Occurrences in Visean Porcelanites of the Lower Carboniferous Carbonate Platform, SW Donets Basin. *Abs. XV ICC-P, Utrecht*, Utrecht, p. 273-275.
8. *Petrovsky, O.P. et al.* (2008). An Integrated 3D Seismic Analysis and Potential Fields Inversion Reveal a TBR Analog for the Dnieper-Donets Basin. *Ext. Abs. 70th EAGE Conf*., Rome, 4 p.
9. *Rogers S.M. (*2001). Deposition and diagenesis of Mississippian chat reservoirs, north-central Oklahoma. *AAPG Bulletin*, vol. 85, no. 1, 115–129.
10. *Porfiriev V.B.* (1948). Metamorphism of carbofossils. *Lviv Univ. Publ*, Lviv, 183 p.
11. *Poletaev V.I., Vdovenko M.V., Shchogolev O.K., Boyarina N.I., Makarov I.A.* (2011). Carboniferous and Lower Permian stratotypes of regional stratigraphic subdivisions in the Don-Dnieper depression – Kyiv: Logos Publ, 236 p. – in Ukrainian
12. *Vakarchuk S.G.* (2003). Geology, lithology and facies of the Visean stage carbonates in the central part of Dnieper-Donets basin versus their petroleum potential. – Chernigiv: *CSTI*, 163 p. – in Russian
13. *Babko I.V.* (2006). Formation peculiarities of the Visean carbonate complex in the central part of Dnieper-Donets basin and its hydrocarbon exploration potential. *Abs. Ph.D. Thesis in Geology*, IFNTUOG, Ivano-Frankivsk, 24 p. – in Russian
14. Matchoulina S.A., Poletaev V.I. (1995). On the origin of rhythmicity of the Visean domanik-like sediments in Ukraine. IGS Geological Jour. no. 2, p. 85-88. – in Russian
15. *Bragin Yu.N., Blazhuk S.V., Poddubnaya T.D.* (2000). A discovery of phosphorites of new geological and genetic type in the Lower Carboniferous of Southern Donbass. *Mineral Resources of Ukraine Jour.,* no. 1, p. 22-23. – in Russian
16. *Maystrenko Yu et al.* (2003). Crustal-scale pop-up structure in cratonic lithosphere: DOBRE deep seismic reflection study of the Donbas fold belt, Ukraine. - *Geology*, vol. 31, no. 8, p. 733-736.

О.А. Кичка, С.Г. Вакарчук, Т.Є. Довжок, Р.О. Гаврилюк

НАФТОГАЗОПОШУКОВІ ПЕРСПЕКТИВИ ТЕКТОНІЧНО КОНТРОЛЬОВАНИХ НИЖНЬОВІЗЕЙСЬКИХ ГІДРОТЕРМАЛЬНО-ДОЛОМІТНИХ КОЛЕКТОРІВ ДНІПРОВСЬКО-ДОНЕЦЬКОЇ ЗАПАДИНИ

Нафтогазопошукові роботи на об’єкти в нижньокам’яновугільних відкладах карбонатної плити турнейсько-нижньовізейського віку Дніпровсько-Донецької западини (ДДЗ) ускладнюються у багатьох випадках через невизначеність їх природи і морфології та брак інформації про просторову будову колекторських відмін у них. Застосування пошукової моделі карбонатних колекторів типу «Трентон - Блек Рівер», яка базується на виявленні тектонічно контрольованих колекторів у вторинних доломітах гідротермального походження (HTD), допомагає вирішенню даної проблеми. Комплексні багаторівневі пошукові об’єкти турнейсько-нижньовізейської карбонатної плити, які можуть об’єднувати різнотипні колектори - біостроми та рифові споруди, масивні вапняки з

інтенсивною внутрішньоформаційною тріщинуватістю (тип резервуару «міссісіпі-лайм»), уламкові та закарстовані породи, що тяжіють до внутрішньовізейського неузгодження (тип «міссісіпі-чат»), та тектонозумовлені гідротермальні доломіти (тип «Трентон-Блек Рівер»), створюють новий перспективний нафтогазопошуковий напрямок для ДДЗ. Нова пошукова стратегія переносить увагу від атиклінальних та власне рифогенних об»єктів, фонд яких вичерпується, на тектонічно ускладнені периферійні зони, локальні западини та моноклінальні схили в прибортових зонах ДДЗ, у такий спосіб значно розширюючи перспективи її промислової нафтогазоносності.

Ключові слова: гідротермально-доломітний колектор, Дніпровсько-Донецька западина, нижній карбон, вуглеводні, розломна тектоніка

А.А. Кичка, С.Г. Вакарчук, Т.Е. Довжок, Р.А. Гаврилюк

НЕФТЕГАЗОПОИСКОВЫЕ ПЕРСПЕКТИВЫ ТЕКТОНИЧЕСКИ КОНТРОЛИРУЕМЫХ НИЖНЕВИЗЕЙСКИХ ГИДРОТЕРМАЛЬНО-ДОЛОМИТОВЫХ КОЛЛЕКТОРОВ ДНЕПРОВСКО-ДОНЕЦКОЙ ВПАДИНЫ

Нефтегазопоисковые работы на объекты в нижнекаменноугольных отложениях карбонатной плиты турнейско-нижневизейского возраста Днепровско-Донецкой впадины (ДДВ) во многих случаях осложняются неопределенностью их природы и морфологии, а также недостатком информации о пространственном распространении коллекторских разностей в них. Применение поисковой модели карбонатных коллекторов типа «Трентон - Блек Ривер», которая базируется на выявлении тектонически контролируемых коллекторов во вторичных доломитах гидротермального происхождения (HTD), помогает решению данной проблемы. Комплексные многоуровневые поисковые объекты турнейско-нижневизейской карбонатной плиты, которые могут соединять разнотипные коллекторы - биостромы и рифовые постройки, массивные известняки с интенсивной внутриформационной трещиноватостью (тип резервуара «миссисипи-лайм»), обломочные и закарстованнные породы, которые приурочены к внутривизейскому несогласию (тип «миссисипи-чат») и тектонообусловленные гидротермальные доломиты (тип «Трентон-Блек Ривер»), создают новое перспективное нефтегазопоисковое направление для ДДВ. Новая поисковая стратегия переносит внимание от антиклинальных и собственно рифогенных объектов, фонд которых исчерпывается, на тектонически осложненные периферийные зоны, локальные впадины и моноклинальные склоны в прибортовых зонах ДДВ, тем самым значительно расширяя перспективы ее промышленной нефтегазоносности.

Ключевые слова: гидротермально-доломитный коллектор, Днепровско-Донецкая впадина, нижний карбон, углеводороды, разломная тектоника

Науково-дослідний інститут нафтогазової промисловості
ДП "Науканафтогаз" НАК "Нафтогаз України", м. Вишневе

Кичка Олександр Анатолійович,
e-mail: kitchka@naukanaftogaz.kiev.ua

Вакарчук Сергій Григорович
e-mail: vakarchuk@naukanaftogaz.kiev.ua

Довжок Тетяна Євгеніївна
e-mail: dovzhok@naukanaftogaz.kiev.ua

Гаврилюк Руслан Олександрович

Стаття надійшла: 30.08.2013