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## **THE FEATURES OF SALT DEPOSITS GEOLOGICAL STRUCTURE AND LITHOLOGIC COMPOSITION IN THE CENTRAL PART OF BORYSLAV-POKUTIAN ZONE (UKRAINIAN CARPATHIAN FOREDEEP)**

The main characteristics of the geological structure and lithologic features of the salt Verkh'n'ovorotyschens'ka suite in central part of Boryslav-Pokutian zone Ukrainian Carpathian foredeep were considered namely in areas: Verkhniy Strutyn, Yasenovets, Roshnyato, Rozsil'na, Kosmach, Dzvinyach, Starunia, Solotvyn, Markova, Molod'kiv. The lithologic features of the salt deposits were analyzed in the investigated territory and the conclusions were made on the prospects and ways of salt resources use in these areas.

*Key words:* Ukrainian Carpathian foredeep, Verkh'n'ovorotyschens'ka suite, salt deposits, geological structure, lithologic features, rock salt and potassium-magnesium salts.

**Introduction.** *The actuality of the work* is associated with the prospects and possibilities for multipurpose use of salt resources in Ukrainian Carpathian foredeep: potassium-magnesium salts, rock salt, with the possibility rock salt use for underground constructions, also considering the aspects of salt geological environment protection. The current state of the salt industry in the Ukrainian Carpathian foredeep may be defined as a crisis. Two large deposits of potassium salts: Kalush-Golynske and Stebnyk are largely worked out and actually are out of exploitation because of catastrophic ecological effects active development within its territory. Further exploitation the rock salt deposits is cost-effective also, but it's has not provided with resources base. Consequently, the detailed studies of the new promising geological objects (deposits) are necessary, aimed at provision of reliable resources base is for the revival of potassium-magnesium salts and rock salt exploitation, ecologically underground construction in the same.

*The purpose of the work* – the author's generalization and interpretation of current data on the geological structure and lithologic composition of the Vorotyschens'ka group salt deposits in the central part of Boryslav-Pokutian zone of Ukrainian Carpathian foredeep.

In view of this purpose due solutions the following *tasks*:

- general structural, stratigraphic and lithostratigraphic characteristic of Vorotyschens'ka group deposits within Boryslav-Pokutian zone;
- structural and lithological characteristic of the investigated areas;
- demonstration of the digital structural-lithologic model examples of the typical geological objects;
- definition the promising areas for potassium-magnesium salts and rock salt resources and the salt massifs suitable for underground storages construction.

As a local geological objects were taken the areas of the central part of Boryslav-Pokutian zone Ukrainian Carpathian foredeep: Verkhniy Strutyn, Yasenovets, Roshnyato, Rozsilna, Kosmach, Dzvinyach, Starunia, Solotvyn, Markova, Molod'kiv

**History of researches.** The tectonic structure of Boryslav-Pokutian zone and the structure of the salt deposits particular covered in many research papers [4, 8, 18] and in numerous industrial reports [2, 9-13].

The lithological features of the Vorotyschens'ka group are reflected in papers [1, 3, 5-7, 14-15].

The factual basis for researches aimed at the characterization of the geological structure and matter composition of the salt deposits were served the results of prospecting and exploration works completed during the Soviet period.

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**The methodology and research methods.** The basis of this publication comprises author's interpretation of geological and geophysical, lithological, mineralogical, geochemical and other investigations undertaken at the reference territory and author's research of potassium-magnesium salts and rock salt lithological composition. A modern interpretation of the salt deposits structure and lithological composition is based upon the implementation of the digital structural-lithological modeling for selected objects using the original methodology developed by interdepartmental scientific and technical team with the author of this work [16, 17].

**Research results.** *General structural and lithological characteristics of the investigated territory.* The investigated territory is the central part of Boryslav-Pokutian zone. It is the part of the nappe (allochthon) in tectonic case having fold-block structure. It is the anticlinorium formed by several tiers of folds. These folds are composed with rocks of Cretaceous and Paleogene flysch overlapping with sediments polyanytska suite and Vorotyschens'ka group. In general, the structure of the area has a mosaic character, so a straight lithostratigraphic correlation between individual (even neighboring) blocks is difficult and often impossible.

The structural and lithological characteristics of the areas forming two longitudinal streaks corresponding general strike of Ukrainian Carpathian foredeep, which significantly differ in salt deposits structural characteristics and lithological composition are given below. Under the definition of "area" we mean tectonic block namely part of the geological medium bounded on all sides by faults and characterized by the presence of Vorotyschens'ki salt deposits. Usually, the direct correlation for lithostratigraphical sections is difficult outside the individual blocks. Most areas of exploration work coincided with the natural boundaries of tectonic blocks.

The first streak include areas Verkhniy Strutyn, Yasenovets and Roshnyato. From the structural point of view they are spatially scattered blocks, and lithological composition is presented by the salt deposits mainly of halitic matter.

*Verkhnostrutynska area* is located in Rozhnyativ district of Ivano-Frankivsk region, in the south-eastern outskirts of the Verkhniy Strutyn village. In structural terms, it is a syncline, complicated by anticline fold in the central part. From the southwest the area is bounded by the frontal thrust of Carpathians Skiba zone; in the north-western and south-eastern flanks on the transverse faults Verkhnoovorotyschens'ki and Dobrotivs'ki sediments are developed, and in the north-east the area is bounded by thrust that separates Boryslav-Pokutian and Sambir tectonic zones. At the lower of Vorotyschens'ka group the terrigenous rocks of Nyzhnoovorotyschens'ka suite are developed: dark gray aleurolites and sandstones with interbeds of argillite clay that changes over salt-bearing breccia. The Verkhnoovorotyschens'ka salt suite is above, which has a thickness of 850 m in its most complete section. The salt deposits can be divided into two members by lithologic composition: lower and upper. The lower member is composed of two thick layers of halite rock separated by argillite and argillite clay and salt breccia. Halite rock is dark gray and gray medium grained with a sporadic fine grains of gypsum and anhydrite, as well as fragments of clay and argillite. Sometimes between the lower and upper member occurs kainite-langbeinite and kainite-polyhalite interbed. The upper member is composed of salt breccia sometimes with lenses of argillite clay that are replaced into a layer of gray fine-grained halite rock. Above the halite rock is covered by a thick layer of the salt breccia. The upper member ends by the interbeds of halite rock with potassium salts lenses of leonite and kainite composition. On the lateral from the central part of the area the thick layers of halite rock become thinner with intercalation of salt breccia. The salt breccia has the widest development among other salt deposits in this area and is the host rock for halite rock, potash salts and terrigenous layers, sometimes filling the whole section of salt deposits. Above the salt layer there are gypsum cap-rock and Quaternary sediments [12].

The *Yasenovets area* is 1500 m south-east from the above considered area and is a continuation of Verkhnostrutynska syncline having certain traits of its geological structure [2].

From the south-west the Yasenovets area is bounded by frontal thrust of Carpathians Skiba zone, and from the north-east – by the thrust that covers deposits of Stebnytska suite. Salt slice is underplayed by Nyzhnoovorotyschens'ka suite deposits that are presented with

argillites and argillite clays with interbeds of aleurolites and sandstones that are very saline on the top. The typical deposits of Verkh'ovorotyschens'ka suite lie above with clear contact mostly and form nine members of rocks. The total thickness of salt deposits is 700 m, which fill the narrow syncline of northwest strike. These members show the rhythm of sedimentation process, which individual stages were ended by the formation of halite layers. The feature of salt deposits in this area is the dominance of halite rock (by 70%), which is a gray rock salt containing fine clay particles and rare fragments of argillite and sandstone. Terrigenous, clay components of halite rocks and anhydrite admixtures form insoluble residue which content is varies from 8.7 to 21% in this area, while the NaCl content reaches 71-89%. The halite rock is fine- and medium grained. Grains are strongly deformed and elongated parallel to the bedding plane. The thickness of halite rocks is variable: from a few meters (at the bottom) to 150 m (at the top). Salt deposits on the entire area under gypsum cap-rock and are overlain by the Quaternary sediments.

There is *Roshnyato area* 6 km south-east from the Yasenovets. This area have the synclinal structure and is divided by transverse fault into two blocks. From the south-west the area is bounded by thrust, in the north-east the area is thrust onto the Sambirska tectonic zone; to the north-west and south-east the syncline closes. Verkh'ovorotyschens'ka suite is underlain by the most ancient rocks exposed in Roshnyato area are the sediments of Nyzhn'ovorotyschens'ka suite that are argillite clays, argillites, aleurolites with interbeds of sandstones, rarely gravelites. Salt deposits fill the central part of the Roshnyativska syncline reaching thickness of 300-700 m and are characterized by a high dip angle in the fold flanks (40-70°). The Verkh'ovorotyschens'ka suite mainly represented by salt breccia with lenses of halite rock that often replace each other and with interbeds of argillite clay. The halite rock for exception of small layers and lenses forms two thick members – lower and upper, which have the resource value. The halite rock is presented with gray, fine- and medium grained halite with fine particles of clay and argillite and sandstone fragments. The content of NaCl in halite rock varies greatly (from 60 to 85%): better value rock salt is in the central part of the area and peripherally contains high amounts of insoluble residue (by 40%). At the top of the upper halite member the kainite-langbeinite potash layer is found. Salt deposits on the Roshnyato area are covered by integrated gypsum cap-rock with the thickness of 10-90 m [13].

Rozsil'na, Kosmach, Dzvinyach, Starunia, Sotolvyn, Markova, Molod'kiv areas are promising for industrial reserves of potassium-magnesium salts. It should be noted that the geological exploration of these areas was carried out to provide resources base Kalush production association "Chlorvinil" or new potash mining enterprise. Geographically they located in Bohorodchans'kyi district, Ivano-Frankivsk region. Each of these areas is a tectonic block bounded by thrusts on the north-east and south-west, and by transverse faults on the north-west and south-east. Sometimes several conjugated blocks oriented along the Carpathian foredeep, have common structural features and they are the sequel to one another, such as blocks Rozsil'na-Kosmach, Dzvinyach-Starunia (Fig. 1). The salt deposits of this territory have a complex morphology and variability of the lithologic composition. This is due to the given structural and lithological features of the salt slice; a detailed study of the territory was conducted in separate blocks. There were collected sufficient material after several stages of geological investigation (detailed prospecting and previous exploration), which used by us for target oriented studies and for modeling of salt deposits [9-11].

The *Rozsil'na area* stretches 15 km in a north-west direction and reaches 6 km across. It is confined to the synclinal fold, which is filled with salt deposits of Verkh'ovorotyschens'ka suite. There are underlying terrigenous deposits of Nyzhn'ovorotyschens'ka suite on the fold flanks. They are monotone gray fractured argillite clays with interbeds of aleurolites, sandstones and gravelites. The Verkh'ovorotyschens'ka suite at the area is composed of salt breccias mostly and halite rock that form up to 12 layers. Rarely there are the interbeds of aleurolites, sandstones and gravelites. It should be noted that represented suite section it is not fully because of erosion of the salt deposits top. However, their thickness reaches 700 m. There are

seven different age potash salts in the suite. The first four are confined to the lower part of the salt slice, and the second four – to the top. The potassium layers are multilayered and frequently overlap each other. The first (lower) seam is substandard in thickness (up to 5 m). The second potassium lens has thickness from 4.5 to 31 m and is composed of polyhalite-kainite-langbeinite rock. The third deposit has sylvite-polyhalite-kainite-langbeinite composition and the thickness from 5 to 8 m. The fourth potash seam forms three separate lenses, the thickness of which varies from 4 to 36 m, and the composition is characterized by kieserite-polyhalite-kainite-langbeinite rock. The fifth potassium lens has thickness of 6-18 m and is composed of epsomite-kieserite-polyhalite-kainite-langbeinite rock. The sixth seam is represented by two potassium bodies with thickness from 1 to 33 m and kieserite-polyhalite-kainite-langbeinite composition. The seventh seam with the thickness from 5 to 11 m is represented by kieserite-polyhalite-sylvite-langbeinite-kainite rock. The salt deposits occur under Quaternary deposits are overlayed by the gypsum cap-rock with the thickness from 20 to 80 m.

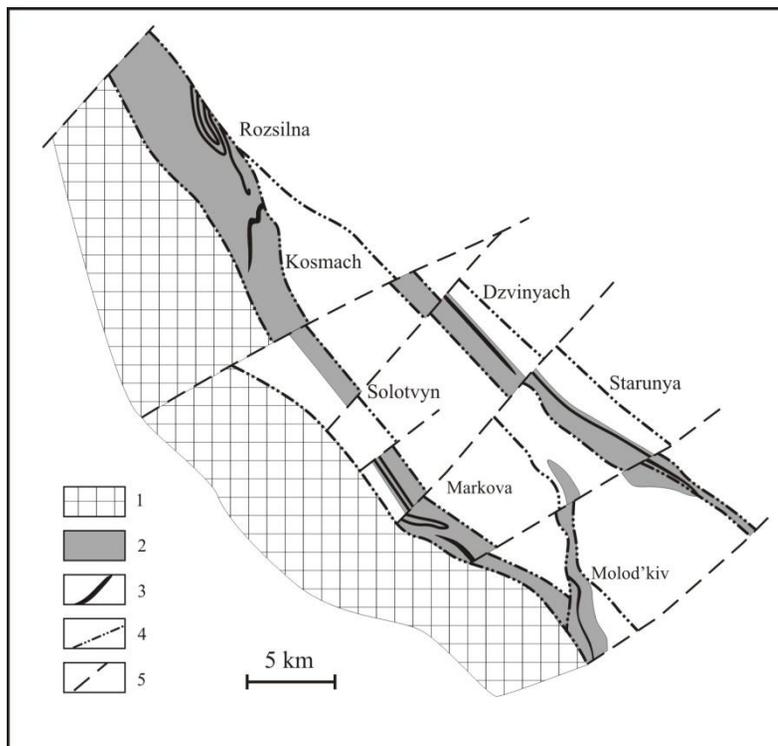


Fig. 1. The scheme of Verkhni'ovorotyschens'ka suite localization within the areas Rozsil'na, Kosmach, Dzvinyach, Starunia, Solotvyn, Markova and Molod'kiv. [10]

1 – Skiba zone of Ukrainian Carpathians; 2 – Verkhni'ovorotyschens'ka suite localization; 3 – potassium salts layers; 4 – thrusts; 5 – transverse faults.

The *Kosmach* area is separated from Rozsil'na area by transverse fault and inherits the features of its geological structure. Thus, the general geological structure of the area has the shape of synclinal fold but complicated by longitudinal anticline. The Kosmach area consists of two narrow blocks that are lowered than Rozsil'na one and have a complete section of Verkhni'ovorotyschens'ka suite with its conform overlapping Stebnyk sediments. The maximum thickness of salt deposits in this area is 820 m. There are potash salt deposits among the salt breccia and halite rock, which prevailing in salt slice. The potash layers are developed in north-west block: the second seam (thickness – 15-21 m), fourth seam (up to 9 m and 34 m), sixth

seam (19-27 m and 4-53 m) and seventh seam (23 m); in the south-east: the third seam (31 m). The potash deposits mineral composition of Kosmats'ka area is like potash deposits of Rozsil'na area, but the layers are thicker, and the salt slice is more complete. Verkh'n'ovorotyschens'ki deposits within this area are largely covered by Stebnyts'ka suite formations, sometimes by the gypsum cap-rock.

The *Dzvinyach* area is located south-east from Kosmach extends for 4.5 km and has a 1-2.5 km across. In terms of structure it is the anticlinal fold, which core is composed of Verkh'n'ovorotyschens'ka suite rocks, and the flanks – Stebnytski deposits. Below the salt deposits there are Nyzhn'ovorotyschens'ki terrigenous formations – gray polymictic sandstones, calcareous aleurolites and noncalcareous argillites. From the north-west and south-east the Dzvinyachs'ka area is bounded by transverse faults, in the north-east it is separated by the thrust between Boryslav-Pokutian and Sambirska zones, and in the south-west Stebnytski deposits are developed.

The salt suite has a thickness of 450 to 1000 m, average – 700 m in this area. In the lower and upper parts of the section the Verkh'n'ovorotyschens'ki deposits are presented by salt breccia with the subordinate content of halite rock, in the middle part – by the salt breccia with interbeds of terrigenous rocks. It is selected eleven stratigraphic potash layers, which are mostly confined to the upper part of the salt slice.

The two bottom layers of potash are located in the south-west of the anticline and are thin (1-6 m) lenses that pinch out toward the fold center and have no economic value. The third potash salt lens is revealed by one borehole only, so due to the lack of data is not conditional, but has a thickness up to 18 m. The fourth deposit forms two lenses of potash salts on different flanks of Dzvinyachs'ka fold of 16-18 m thick, which are kainite-langbeinite rock with the admixture of kieserite, sylvite, polyhalite. The fifth and sixth seams are thin lenses of potassium rocks. The seventh potash seam consists of two lens bodies at the different fold flanks: on the south-west with thickness of 16-32 m, and on the north-east – 8-77 m. The eighth potash layer has lens structure also and sylvite-langbeinite-kieserite composition with the admixture of polyhalite, kainite, anhydrite and the thickness of 32 m, which reduced sharply with depth. The ninth potash layer has thickness of 26 m and is characterized by kainite-kieserite-langbeinite composition similar to the composition of the fourth potash seam. The tenth potassium layer has the thickness of 19-33 m, high dip angle (75°) and become not conditional with depth, and the composition is similar to the eighth seam. The eleventh deposit is not conditional by the spreading and the thickness.

So Dzvinyachska area contain 5 industrial layers of potash salts of mixed (mostly – sylvite-kainite-kieserite-langbeinite) composition with an average content of K<sub>2</sub>O – 10,04%, MgO – 9,95% and insoluble residue – 14,06%.

Above the salt deposits of Verkh'n'ovorotyschens'ka suite there are terrigenous rocks of Stebnyts'ka suite that are red, brown, gray aleurolites and argillites with interbeds of sandstones and gravelites. In the central part of the area, where salt deposits are under the Quaternary, the Verkh'n'ovorotyschens'ka suite is covered by gypsum cap-rock that within this area have the thickness of 15-90 m. Quaternary deposits are presented by the gravel (2-25 m) and the loam (0-20 m).

*Starunya* area in geological terms is a south-eastern continuation of Dzvinyachska area and is separated from it's by transverse fault along which it is shifted in a north-east direction at 500 m. It is 4000 m long (from the north-west to south-east) and 600 m across. The structure of Starunska area is similar to the Dzvinyachska area in anticlinal character with high dip angle in the fold flanks (60-85°), but the salt deposits are characterized by some differences.

The thickness of Verkh'n'ovorotyschens'ka suite in this area ranges from 250 to 1000 m. There are three rock members in its structure: lower and upper – salt-bearing, and middle – terrigenous member, in the south-west replaced by salt breccia. Halite rock and potassium salts are confined to the upper part of the salt suite and are developed on the north-east flank of the anticline only. There are three potash layers within the area that stratigraphically correspond to

potash seams five, six and seven of Dzvinyach area. The fifth and sixth layers have a little thickness (3-5 m) and irregular occurrence, so do not have the economic value. The seventh potash layer extends for 3500 meters and has thickness of up to 32 m, but sharply pinch out to dip. It is the kieserite-langbeinite rock for the mineral composition with considerable kainite admixture. The average content of  $K_2O$  – 12,34%,  $MgO$  – 11,13% and insoluble residue – 12,26%. The considerable part of the Verkh'n'ovorotyschens'ka suite is covered by terrigenous deposits of Stebnyts'ka suite, and in places of salt formations beneath Quaternary sediments the gypsum cap-rock is formed with thickness of 25-100 m. Verkh'n'ovorotyschens'ka and Stebnyts'ka suites are overlain by Quaternary gravel and loam.

South-east from the Kosmach area the *Solotvyn area* stretches, which in structural terms is a monocline of north-east dip (south-west limb of Monastyrchanska syncline). Salt slice have a little thickness here (450-500 m) and are localized narrowly with the width of 150-400 m and the length of 4000 m. It is underlain by terrigenous formations of Nyzhn'ovorotyschens'ka suite. The Verkh'n'ovorotyschens'ka suite consists of three members in place of the maximum thickness. Lower member is represented by salt breccias and halite rock that contains a low-thickness (7.5 m) potassium layer of kainite composition. The second member is also begins with salt breccia that changes over halite rock containing potassium layer of kainite composition. The third member is represented by salt breccia only, above which the whole suite is overlain by terrigenous formations of Stebnyts'ka suite. There are the gypsum cap-rock above the salt deposits and under Quaternary sediments.

South-east from Solotvyns'ka area there is *Markova area* separated by transverse fault, south-western boundary of which is the front thrust of Carpathians Skiba zone. This area also divided by transverse fault into two blocks: north-west and south-east. In the north-western block salt slice are deposited on the formations of Nyzhn'ovorotyschens'ka suite and are represented by two members: bottom – halite rock, replaced by salt breccia; top – more thick, presented by halite rock also that covered by salt breccia, which completes the section of Verkh'n'ovorotyschens'ka suite in this block. At the lower member of the halite rock the first potash layer of langbeinite-kainite composition is found with the thickness of 2 m. Upper member is characterized by the presence of three potash layers: the sixth and seventh deposits have thickness of 5 and 6.7 m, and are langbeinite-kainite rocks; the eighth deposit has a little thickness (up to 2 m) and irregular in strike, so is not conditional.

The south-east block of Markov area is characterized by similarity of composition and structure of salt deposits, but marked more salt saturated section: a larger number of potash layers of conditioned thickness, bigger thickness of halite rocks and wider development of salt deposits on the area in general. There is the first, second and third potash seams at the lower member with the thickness from 2 to 48 m, but conditioned is the second seam only – kainite-langbeinite rock. The fourth deposit is localized in the middle of the salt slice and has the thickness of 10 m, but occurs at great depths (1060 m). There are six potash salt layers (5, 6, 7, 8, 9, 10) at the top of the salt slice, which are subparallel ore bodies that pinch out sharply with depth and gathered in the small syncline. The fifth, seventh and ninth layers are conditional only, with a length of over 1000 meters, the total thickness of more than 200 m and are composed significantly of langbeinite rock with small admixtures of polyhalite and kainite. The sixth and eighth lenses are non conditional in thickness, and the tenth layer lies directly under the gypsum cap-rock that makes it impossible to exploit.

Thus, there are seven conditioned potash seams among the salt deposits of Markov area (two – in the north-west block and five – in the south-east). The Verkh'n'ovorotyschens'ka suite is overlain by the gypsum cap-rock for prevailing square of its occurrence within the study area. In the north-eastern area only under the salt deposits lie terrigenous formations of Stebnyts'ka suite.

The last of Rozsilna potash deposits group is *Molod'kiv area*, which is located south-east from the Markov area and they are separated with transverse fault. In structural terms, the Molod'kiv area is confined to closure of Monastyrchanska syncline, where are the salt deposits

of Verkh'n'ovorotyschens'ka suite. They are presented by two members of salt slice: lower – halite rock and salt breccia, separated by thick layer of sandstone (30 m). The upper member is separated from the lower by a layer of argillite and is composed of halite rock and salt breccia. There are identified six potash layers (four of them are conditional), which are confined to the upper part of the salt suite. They are located in the north-east fold flank and with high angle (80-85°) dip in a south-west direction, forming the extended (up to 3000 m), but narrow layers (maximum width is 200 m). There are mainly kainite-langbeinite potash ores with substantial content of kieserite and polyhalite for mineral composition on Molod'kiv area. K<sub>2</sub>O contents are within 10-12%, MgO – 9-12% and insoluble residue – 8-12%. The salt deposits in the central part of the area are covered by Stebnyts'ka terrigenous suite, and in the south-east, north-east and north-west are under the gypsum cap-rock that is covered by the Quaternary sediments.

**The digital structural-lithological models of Rozsil'na group areas** were made for potassium-magnesium salts prognosis and complex modern geological data base creation. This data base has to serve as informational provider for any investigations or exploitation works on this territory. The factographical base for modeling is the dismembering of 183 deep wells drilled on the researching territory in the 1960s and 1980s during the several stages of prospecting and preliminary exploration works. The digital structural-lithological model built in the GIS application, ArcView, allowed the visualization of the following characteristics of salt-bearing deposits Rozsilna-Markova group potash deposits:

- structural (hypsometry of the roof, floor and the thickness of salt-bearing deposits);
- lithological (distribution of selected lithological rock types: salt breccia, halitic rock and kainitic, langbeinitic, sylvinitic and also type of mixed potassium salt).

The models are possible to identify thick volumes halitic rock and make conclusion about the prospects of these areas in terms of rock salt also. The significant derivative (visualization) of the digital structural-lithological models Rozsil'na-Markova group of blocks is demonstrated (Fig. 2).

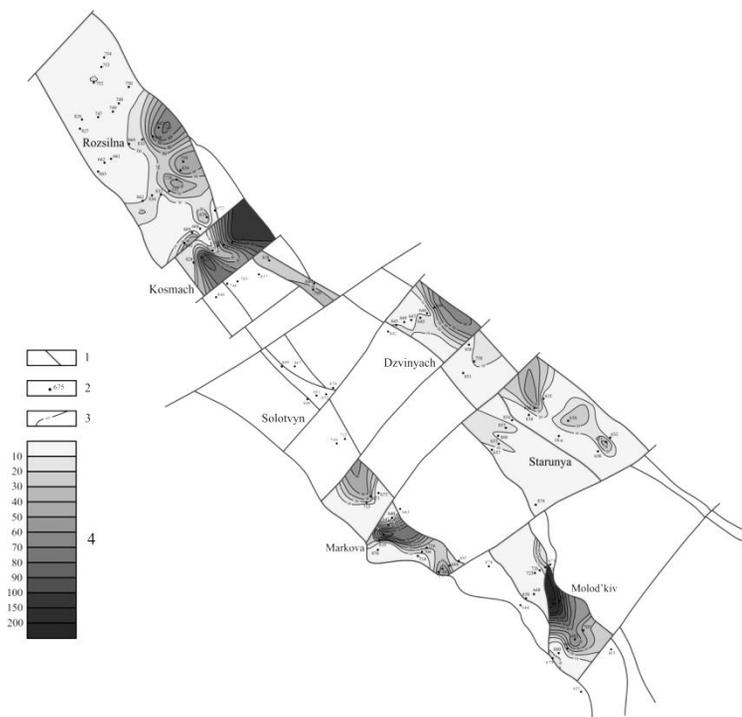


Fig. 2. The digital structural-lithological models derivative (visualization). The thickness of potassium salts within the areas Rozsil'na, Kosmach, Dzvin'yach, Starunya, Sototvyn, Markova and Molod'kiv. 1 – thrusts and faults; 2 – wells and its numbers; 3 – lines of potassium salts thickness; 4 – the potassium salts thickness.

**Conclusion.** The basic characteristics of the geological structure and the features of lithological composition for the number of salt deposits in Boryslav-Pokutian zone of Ukrainian Carpathian foredeep have been obtained as a result of the author's compilation and analysis of factographic data and its interpretation on the basis of modern geological concepts. The results obtained may be used as a basis for development of a strategy salt-bearing deposits management (i.e., potassium and magnesium salts and rock salt resources use, the direction of underground construction and protection of geological medium). The large-scale digital structural-lithological models construction is proposed as the most effective tool of informational providing to solve specific practical problems of local geological objects handling (deposits of potassium and magnesium salts, rock salt, areas favorable for underground construction, as well as areas requiring the protection and remediation of the technogenic disturbed salt medium). The most significant cartographic derivative (visualization) of the models is shown to demonstrate the effectiveness of the proposed technology.

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Кирпач Ю.В.

### **Особливості геологічної структури і породного складу соленосних відкладів в центральній частині Бориславсько-Покутської зони Передкарпатського прогину**

Розглянуто основні риси геологічної структури і особливості породного складу відкладів верхньоворотыщенської соленосної світи в центральній частині Бориславсько-Покутської зони Передкарпатського прогину, а саме на площах Верхній Струтин, Ясеновець, Рошнято, Розсільна, Космач, Дзвіняч, Старуня, Солотвин, Маркова, Молодьків. Проаналізовано особливості породного складу соленосних відкладів на досліджуваній території та зроблено висновки щодо перспектив і напрямків використання соляних ресурсів на цих площах.

*Ключові слова:* Передкарпатський прогин, верхньоворотыщенська світа, соленосні відклади, геологічна структура, літологічні характеристики, кам'яна і калійно-магнієві солі.

Кирпач Ю.В.

### **Особенности геологической структуры и породного состава соленосных отложений в центральной части Бориславско-Покутской зоны Предкарпатского прогиба**

Рассмотрены основные черты геологической структуры и особенности породного состава отложений верхневоротыщенской соленосной свиты в центральной части Бориславско-Покутской зоны Предкарпатского прогиба, а именно на площадях Верхний Струтин, Ясеновец, Рошнято, Рассильна, Космач, Дзвиняч, Старуня, Солотвин, Маркова, Молодьков. Проанализированы особенности породного состава соленосных отложений на исследуемой территории и сделаны выводы перспектив и направлений использования соляных ресурсов на этих площадях.

*Ключевые слова:* Предкарпатский прогиб, верхневоротыщенская свита, соленосные отложения, геологическая структура, литологические характеристики, каменная и калийно-магниевоы соли.

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