

the simulation, especially for reservoir areas.

The natural reservoirs with less thickness, which predominate within the Bulgarian brownfields, could contain significant hydrocarbon resources. One of the main problems with this type of reservoirs is the conical effect around the bottomhole zone, which has a negative impact on the degree of efficient oil extraction. Therefore, applying the methodology of 3D reservoir and simulation is extremely important to select the optimal strategy in the projection of well locations (position, length, distance from the fluid contacts, rates). Practice shows that horizontal wells are the most suitable for the exploitation of reservoirs with less thickness. The ability to achieve high oil and gas production over a longer period of time with controlled rates are just some of their advantages.

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STUDY OF NATURAL SALINIZATION AND TECHNOGENIC DESALINIZATION OF RESERVOIRS DURING EXPLORATION AND DEVELOPMENT OF OIL FIELDS

Oil fields of the Pripyat oil-and-gas bearing region and regions of the south of the Siberian platform occur in saline reservoirs. Salinization of rocks significantly impairs their porosity and permeability, which reduces the efficiency of geological exploration for oil and gas in the areas with the most intense salinization. The ability of halite to dissolve when interacting with the water injected for oil displacement leads to a significant change porosity and permeability properties of the reservoirs during the development of oil deposits, that has a significant impact on well operation and field development in whole. It all goes to show that it is necessary to study the scale of natural salinization and technogenic desalinization of reservoirs from all sides and take into account the features of its manifestation during exploration and development of oil deposits [1].

Salinization of rocks of the East Siberian and Belarusian hydrocarbon deposits was noted when studying the lithological composition of subsalt and inter-salt deposits in the sixties and seventies of the last century. For the first time V.S. Mulyak and F.N. Yakovenko (1965) as well as Yu.I. Maryenko and V.G. Postnikov (1967) pointed out the presence of halite in the productive horizons of the Markov field in the south of the Siberian platform. At the present time the salinization of rocks is recorded here in almost all oil and gas prospecting areas and hydrocarbon reservoirs. The first information about the salinization of the inter-salt and subsalt rocks of the Pripyat trough is given in the published works of A.V. Kudelsky and K.M. Obmoryshev (1971), R.S. Sakhigareev (1974), V.V. Panov (1975), V.L. Tyumentsev (1977). The most complete characteristic of data on salinization of rocks from different regions can be found in the works of A.A. Makhnach (1982, 1989). Meanwhile the initially lithological, descriptive study of saline rocks is transferred into a complex lithohydrogeochemical study of the conditions for the formation

of halite in the void space of sub-evaporite strata. In the same period works on the hydrogeochemical study of this problem appeared, in which these issues were solved by studying the saturation degree of formation waters of subsalt and inter-salt complexes with sodium chloride (V.G. Zhoglo, 1977, Bukaty et al., 1981.).

Numerous laboratory studies of the salinization degree of oil and gas reservoirs in wells of oil fields in Eastern Siberia and Belarus showed a significant effect of the salinization process on porosity and permeability [1, 2]. In different regions of the considered territories the association of salinization to certain lithofacies has been established. Nevertheless, such studies have characterized only a small part of the section of individual wells, which did not allow to assess correctly the scale of the manifestation of this process as a whole. The assessment can be carried out in more detail when investigating the process of desalinization of such reservoirs during the operation of oil fields, the development of which is carried out with the injection of low-salt waters into productive reservoir to displace oil to the bottom of production wells. For the first time such an approach to assessing the scale of salinization of productive rocks was proposed and tested in 1996 by V.D. Poroshin. Since then, such studies have been carried out regularly for the majority of wells of Belarusian oil fields producing water-cut wells. As a result, for the first time in quantitative terms the scale of dissolution of halite contained in cracks, pores and caverns of productive horizons was established during the development of a number of oil deposits. The results of such an assessment carried out by the authors using new methodological techniques (S.L. Poroshina, 2020) [3] for the Voronezh deposit of the Zolotukhinskoe field indicate that the total volume of halite dissolved and carried out with associated waters for the entire period of its operation is estimated at 7581 m³. It is shown that these processes are actively continuing in the Belarusian deposits at the present time. The schematic maps constructed on the basis of these data indicate the irregularity removal of dissolved halite by associated waters in different parts of the deposits, which may represent the extent of natural salinization within the study areas.

The presented materials indicate that the assessment of the scale of salinization of productive oil and gas reservoirs and the study of the process of their desalinization during the development of hydrocarbon deposits should be carried out in a complex using the methods of lithological, lithofacies, hydrogeochemical and field hydrochemical (lithohydrogeochemical) studies.

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