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ENVIRONMENTAL ISSUE OF THE EXTRACTION OF LOW PERMEABLE RESERVOIRS IN THE NOTHERN STRUCTURAL ZONE OF THE PRIPYAT TROUGH

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The article has touched upon the problem concerning environmental and health issues of shale oil and gas production. According to the Pripyat satellite image, structural zoning maps of subsalt and intersal complexes the satellite image interpretation of the Pripyat petroleum bearing area has been completed. The findings help the reader to make clear understanding in the field of mining low permeable reservoirs and take into account environmental hazards.

Keywords: hard-to-recover oil reserves; semi-reservoir; horizontal well; multi-stage hydraulic fracturing; tectonic zoning; hydrocarbon potential.

ЭКОЛОГИЧЕСКИЕ ПРОБЛЕМЫ РАЗРАБОТКИ НИЗКОПРОНИЦАЕМЫХ КОЛЛЕКТОРОВ СЕВЕРНОЙ СТРУКТУРНОЙ ЗОНЫ ПРИПЯТСКОГО ПРОГИБА

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Исследована проблема, связанная с вопросами экологии при добыче сланцевой нефти и газа. Выполнено структурное дешифрирование Припятской нефтегазоносной области с помощью космического снимка, а также по данным карт структурного районирования подсолевого и межсолевого комплексов. Полученные результаты помогут составить четкое представление в области разработки низкопроницаемых коллекторов и принять во внимание экологические опасности.

Ключевые слова: трудноизвлекаемые запасы нефти; полуколлектор; горизонтальная скважина; многостадийный гидроразрыв пласта; тектоническое районирование; углеводородный потенциал.

Hydraulic fracturing treatment, or fracking, has already occupied a certain place on the global oil market among the intensification methods of

hydrocarbons to borehole bottoms. The technology requires special attention for this reason.

The definition of low permeable rocks commonly associates with unconventional oil reservoirs among geologists in Russian literature. The term semi-reservoir is usually used in relation to the Pripyat oil and gas basin.

The extraction of shale oil and gas justifies advanced technologies that are being used to identify, explore and develop at least some of the hydrocarbons from shale and tight plays in the world. The development of unconventional oil fields begins with tertiary (third) recovery. In addition, the most effective are physical methods of enhanced oil recovery and the methods of influencing on the bottom hole zone. One include drilling horizontal wells, hydraulic fracturing treatment or wave action, while the other call for acid processing and well's perforation.

Generally, well fracturing must fix the problems of fracture placement, crack opening displacement, frac fluid recovery and formation productivity. Horizontal drilling enables wells to have a much longer pay zone than a traditional vertical well. Hudraulic fracturing produces porosity in the rock unit that facilitates movement of oil or gas to the well. Together, these methods allow a single well to drain a much larger volume of rock and more efficiently recover the oil and gas resources. So far, the only effective method of tight oil development has been the drilling of horizontal wells followed by cluster Plug and Perf technology of fracking. It is accommodated on the basis of Belorusneft.

The Rechitsa oil field is deposited within the Pripyat Paleorift Basin. It is Late Devonian in age and includes several stratigraphic divisions [1, p. 111].

In the Republic of Belarus, the main prospects for the development of hydrocarbons from unconventional deposits are associated with semi-collectors within the Pripyat trough. The main stratigraphic subdivision of the sedimentary section, promising for the search for hydrocarbons in them, is the Famenskaya inter-salt stratum [2, p. 130].

The Rechitsa oil field has a complex thermal history. Being situated in the north-eastern part of the trough, Rechitsa region is characterized by the period of maximum geothermal stress. It corresponded to the occurrence of the main oil and gas generation phase in the past. Appropriate reservoir conditions have determined active formation of hydrocarbons and their possible subsequent migration into adjacent rocks within the oil field [3, p. 90].

Being active at the latest neotectonic stage, linear and arcwise relief elements are associated with deep faults on a planetary scale. During satellite image interpretation lineament systems have been indentifyed. Special attention is given to the Earth;s surface features, or terrain features, such as river valley morphology. These properties highlight the intensity of deep-seated faults on the images [4, p. 11].

The mining of oil shale can create environmental problems. There is a space problem, for during distillation the shale expands. Spent shale could be piled in valleys and compacted, but land reclamation would be troublesome. A great amount of water is required, both for distillation and for reclamation, and water supply is always a problem in the arid regions. New processing techniques that extract the oil in place without bringing the shale to the surface may eventually help solve some of the problems and lower the water requirements. It is possible to burn fractured oil shale in large underground excavations. The heat separates most of the oil from the rock; the oil can be collected as a liquid. The fires, however, would be hard to control and would affect ground-water levels. Another proposal involves heating the shale with radio waves or microwaves to separate the liquid oil from the rock [5].

The consequences of the technology are at a high degree of danger. They have a great impact on a person safety and environment. Solutions consist of methane or some radioactive elements and penetrate aquifers afterwards. Thus, hydraulic fracturing treatment and chemical solutions containing a great amount of harmful substances, various chronic diseases may be provoked.

Moreover, due to pollution of water resources and increased risk of earthquakes, it is banned in several countries of the world. Industrial production of shale oil and gas because of geological features requires large-scale drilling of the territory with immense wells or bushes of wells. At the same time most companies aim to preserve the natural uniqueness of their region in its original form.

According to the environmental data about 78 % of all waste generated within the company has being reused in Belorusneft. Waste-free production and secondary usage of resources are the areas where the environmental protection department of the company is engaged in.

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