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МЕТОДЫ УПРАВЛЕНИЯ ПРОИЗВОДИТЕЛЬНОСТЬЮ СКВАЖИН В УСЛОВИЯХ МЕСТОРОЖДЕНИЯ Ю. КОРЧАГИНА

Месторождение им. Ю. Корчагина стало первым объектом промышленной добычи углеводородов на российском секторе Каспийского моря и одним из ключевых примеров комплексного освоения шельфовых запасов. Особенностью его разработки является использование горизонтальных и многоствольных скважин с протяжёнными фильтрационными интервалами. В статье рассмотрены основные геолого-технические и технологические решения, направленные на повышение продуктивности скважин, минимизацию газопроявлений и оптимизацию эксплуатации в условиях сложного геологического строения и высокой сейсмической активности региона.

Ключевые слова: Каспийский шельф; месторождение им. Ю. Корчагина; продуктивность скважин; горизонтальные скважины; управление разработкой; прорыв газа; сейсмическая активность.

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METHODS FOR MANAGING WELL PRODUCTIVITY IN THE CONDITIONS OF THE Y. KORCHAGIN FIELD

The Korchagin field was the first commercial hydrocarbon production facility in the Russian sector of the Caspian Sea and one of the key examples of integrated development of offshore reserves. A special feature of its development is the use of horizontal and multi-barrel wells with long filtration intervals. The article considers the main geological, technical and technological solutions aimed at increasing the productivity of wells, minimizing gas occurrences and optimizing operation in conditions of complex geological structure and high seismic activity in the region.

Keywords: Caspian shelf; Y. Korchagin field; well productivity; horizontal wells; development management; gas breakthrough; seismic activity.

The development of hydrocarbon production on the Caspian shelf is a strategic direction for building up Russia's resource base. The Y. Korchagin field, discovered in 2000, became a pilot project for the development of the North Caspian water area [1, c. 136]. Its commercial development began in 2010, and the experience gained in its implementation is important for subsequent offshore projects.

The main task of field operation is to ensure stable oil and gas production with minimal losses against the background of difficult geological, physical and technical conditions [2, c. 56]. The key direction was well productivity management by optimizing their design, profile and development system.

The field is located in the northern part of the Caspian Sea, characterized by shallow water (up to 26 m deep) and a continental climate with pronounced seasonal temperature fluctuations and wind loads [3, c. 98-99]. The area belongs to the

seismically active zones affected by the Makhachkala and Mangyshlak structures, which requires a special approach to the design of drilling platforms and wells.

There are six deposits in the structure of the field: one gas (Paleogene), three gas condensate (Albian, Aptian, Callovian) and two oil and gas condensate (Neocomian superlayer and Volga stage) [3, c. 105, 4, c. 29-32]. The main industrial production is concentrated in the Lower Cretaceous and Jurassic deposits, which are characterized by variable permeability and heterogeneous saturation.

The development is mainly carried out by a system of horizontal wells with a large length (more than 5 km), which is due to the structure of the deposit, represented by an oil rim under a powerful gas cap. Horizontal opening of the reservoir allows you to increase the drained area and reduce the risk of premature gas breakthrough.

To achieve the maximum oil recovery coefficient, multi-barrel and multi-hole structures are used, which ensure the involvement of hard-to-recover zones in the work. Additional trunks are oriented along the stratification, which increases the uniformity of drainage and reduces the water content of products.

Production column designs are designed to meet high reservoir temperature and pressure requirements, as well as tightness requirements. At offshore facilities, special attention is paid to the reliability of cementing and monitoring the condition of the support, since any leaks can lead to inter-layer overflow or gas phenomena [5, c. 13].

Taking into account the specifics of the deposits of the Y. Korchagin field, the following areas of productivity regulation are applied:

1. Optimization of the barrel trajectory. Geo navigation technologies allow drilling along the most productive intervals, taking into account the lithological heterogeneity. Maintaining the well within the oil-saturated part of the reservoir ensures high filtration efficiency and a steady flow rate.
2. Monitoring of gas breakouts. The main problem of development is gas-condensate manifestation from the upper horizons. To prevent it, physical and chemical methods of regulating the inflow are used: limiting the depression on the

reservoir, installing packers and using water-insulating compounds in the oil-gas contact zone.

3. Monitoring the inflow dynamics. Changes in the flow rate, water cut, and pressure in the face are analyzed online. The use of intelligent control systems (smart well systems) allows you to quickly change the operating mode of the well, adjusting the flow rate at separate filtration intervals.

4. Technologies for limiting water flow. As water content increases, gel-forming compositions and polymer systems are introduced, selectively blocking water-permeable channels. This helps to stabilize the displacement front and increase reservoir oil recovery.

5. Intensification of the inflow. Hydraulic fracturing with micro seismic response control is used for low-permeability intervals. Procedures are carried out taking into account the risks of gas breakout and possible violation of the integrity of the barrel.

Work on the Caspian shelf requires a comprehensive approach that includes not only the technological, but also the environmental component. Processing of the extracted products is carried out on an offshore platform, which complicates the processes of separation and preparation of oil. All systems are designed with an increased level of automation and redundancy [6, c. 8; 7, c. 20-21].

The seismic activity of the area makes it necessary to constantly monitor the condition of support structures, drilling frames and wellhead equipment. The impact of vibrations and wind loads is taken into account when calculating the permissible deviations of the well path and when choosing the diameter of casing strings.

Experience in the development of the Y. Korchagin field has shown that well productivity management at offshore facilities requires a combination of geological and technical flexibility and comprehensive monitoring. The use of horizontal and multi-barrel structures ensures high flow rates and drainage efficiency, but requires precise monitoring of gas occurrences and reservoir conditions.

The introduction of intelligent technologies, water flow control systems, and optimization of drilling trajectories make it possible to increase production stability

and extend the effective life of the field. The results obtained can serve as a basis for improving technologies for managing the development of other offshore objects in the Caspian region.

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