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Improving the Methodology for Creating Design Documents for the Development of Hydrocarbon Deposits

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ABSTRACT: The article considers a proposal to improve the methodology for creating design documents for the development of hydrocarbon deposits in Uzbekistan, linking the tasks of developing scientific and technical solutions with the assessment of geological, technological and technical and economic risks through geological and hydrodynamic modeling of the deposit and monitoring its development at all stages of development.

KEYWORDS: hydrocarbon deposit, integrated design, pilot production (PPE), industrial development, additional development, risks, geological and hydrodynamic modeling and control of field development.

I.INTRODUCTION

More than two hundred fields with industrial reserves of natural gas have been discovered in Uzbekistan.
The average depletion of reserves of half of them - long-developed fields - is 66.0%. These fields are represented by large hydrocarbon reserves of massive type reservoirs with high reservoir properties and carbonate-reef deposits of the Jurassic period, exploited for up to forty years.
Slightly less than half of all deposits with a depletion rate of up to 50% are characterized by average reserves, massive-arch type of deposits, represented by carbonate deposits of the Jurassic period with reservoir properties two times lower than the reservoir properties of reef deposits, and have been exploited for no more than twenty years.
The remaining small group of deposits, represented by carbonate Jurassic and terrigenous and Cretaceous deposits of the layer- arch type, with a depletion rate of up to 20%, are characterized by small reserves and deteriorated reservoir properties, and have been in operation for about 15 years.

II.METHODOLOGY

It should be noted that despite the relatively high depletion of reserves at large deposits, they have the potential for further profitable extraction of hydrocarbons of up to 80-85%.
At the current stage of development of the oil and gas industry of the Republic, tasks are set for the development and implementation of new geological, technological and technical solutions aimed at increasing the rate of development of reserves of all types of deposits, bringing their reserve recovery factors to at least 85-90%.
The solution to these problems is inextricably linked with the development of an integrated system of scientific, technological and design support for work on the modernization of long-exploited deposits and new facilities discovered as a result of geological exploration work.
Until recently, the process of developing hydrocarbon deposits was characterized by multi-stage design decisions and their implementation in the practice of developing oil and gas production facilities. At the same time, the possibility of negative impact of risks on the technical and economic indicators of well drilling, development and operation of deposits was not taken into account, and the importance of geological and hydrodynamic control during the operation of hydrocarbon deposits in a systemic linkage with technical and economic indicators was underestimated.
This approach, in the current conditions of modernization of long-exploited and developed fields with relatively small reserves, which have uncertainties in their confirmation based on the results of pilot industrial operation, causes the manifestation of risks of failure to achieve design production indicators.
In connection with the above, in order to accelerate the design and development of numerous developed, prepared and explored gas condensate fields in Uzbekistan, a system of integrated design for the development and development of natural gas production facilities is proposed, providing for the combination of scientific, technological and design work

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on their development in a single technological cycle, in combination with reliable geological and hydrodynamic control over their operation.

The main provisions of the integrated design system include:

- combination of design work on pilot industrial operation, industrial development (additional development) and development of deposits in integration with the tasks of designing technical and economic indicators of the full cycle of deposit development;
- approval at the level of companies engaged in oil and gas activities of uniform requirements for the composition, procedure for development, coordination and approval of technical and economic justifications for projects for the development (further development) of hydrocarbon deposits and design and estimate documentation.

The proposed system of integrated design of field development includes the following stages of scientific and technological work, integrated with the tasks of accelerated development of fields:

Stage I - implementation of a comprehensive working project for pilot industrial exploitation of deposits, for pre-estimated and operational reserves.

This documentation is compiled based on the materials of geological exploration work carried out at fields prepared for development for accepted reserves of industrial category hydrocarbons, or for operational reserves accepted on the balance sheet.

The documentation created at this stage of design includes technical and economic indicators of the project with cost estimates approved in accordance with current state acts. The project for pilot industrial exploitation of the deposit is accepted for a period of 5 years and includes work on geological exploration of the deposit in a systematic link with the start of its development.

II - a comprehensive working project for the development of the field is drawn up based on the results of the pilot industrial operation of the field and additional exploration work for the approved industrial reserves of hydrocarbons. This stage of work provides for the implementation of a full range of research and design work for the period of development of the field until the reserves are depleted by 50-55%.

Stage III - a comprehensive working project for further development of the field is drawn up based on the results of field development, with reserves being developed by more than 50%, for the approved current industrial hydrocarbon reserves, with their confirmation by the results of long-term operation. This design documentation should be drawn up for the extraction of reserves from fields at a level of no less than 85-90% of their initial reserves.

In the process of improving the methodology of development design, the integrated design system was revised and supplemented taking into account new requirements due to the specifics of the development of natural gas fields in the Ustyurt region of Uzbekistan, which are distinguished by a complex geological structure and problems of their development already at an early stage of development. Conceptual provisions in the field of development system design were revised and new methodological provisions were introduced to take into account possible risks in the design of underground and surface parts of fields, as well as geological and hydrodynamic modeling and control at all stages of development.

III.CONCLUSION

Research on improving the methodology for designing field development shows an urgent need to combine scientific, technological and design work on the development of hydrocarbon production facilities, taking into account possible risks, diversity and complex geological structure, using geological and hydrodynamic modeling and development control at all stages of hydrocarbon deposit development.

The solution to the problems of designing the development of the underground part of deposits in a systematic way with the preparation of design and estimate documentation for the development of production facilities based on multi-variant studies allows for the operation of deposits with higher rates of hydrocarbon production and an increase in the depth of their production.

The solution of scientific, technological and design problems in a single design complex and system integration with the tasks of geological and hydrodynamic control of the efficiency of field development allows for timely management of geological, geological and technological, technical and financial and economic risks at all stages of their development.

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