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# **Justification of Technological Modes of Operation of Gas and Gas Condensate Wells**

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**ABSTRACT:** This paper discusses the rationale for the technological modes of operation of gas and gas condensate wells, the influence of many factors on the technological modes of operation during the operation of gas and gas condensate wells, and the principles for establishing optimal technological modes of operation.

**KEY WORDS:** Technological regime, gas and gas condensate wells, production rate, destruction of the bottomhole zone, formation of a sand-liquid plug, formation of a bottom water cone, hydrate formation, corrosion.

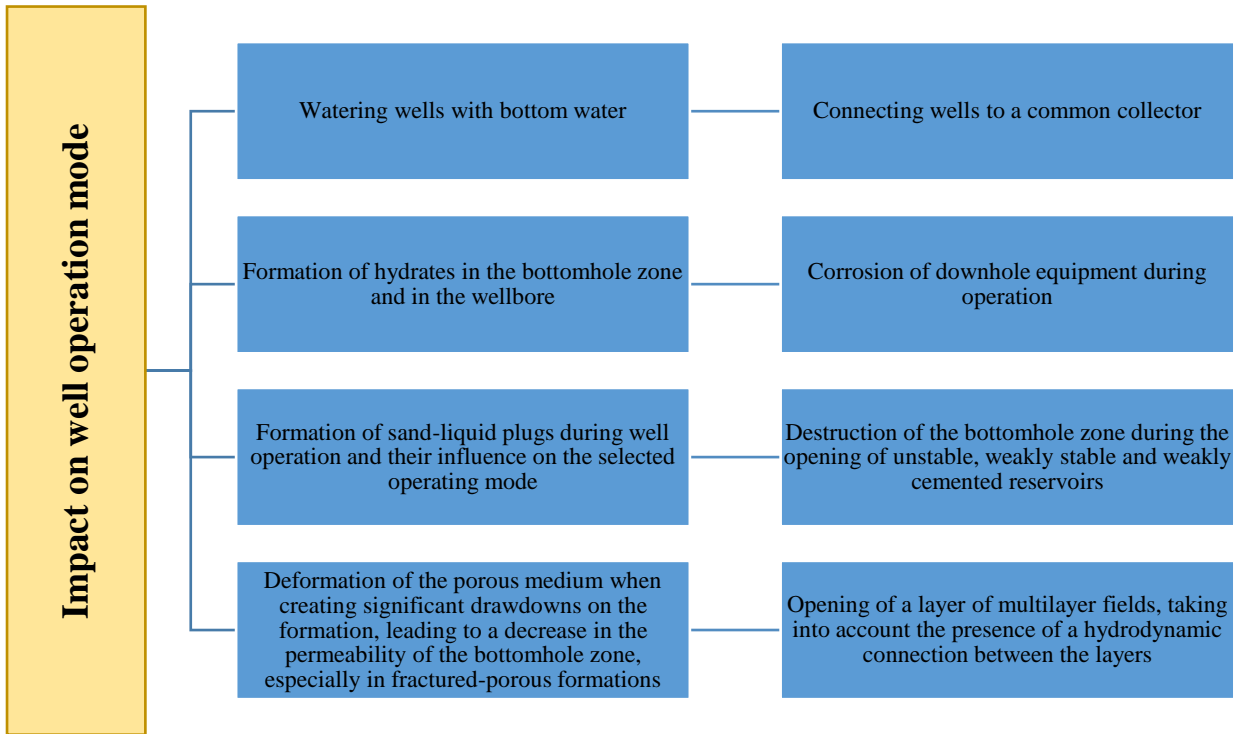
## **I. INTRODUCTION**

The development of a gas and gas condensate field is understood as the management of the processes of movement of gas and condensate in the reservoir to wells in order to produce gas and condensate. Such control is achieved through a specific reservoir development system. The gas and gas condensate reservoir development system implies the allocation of production facilities, the placement of the required number of production, observation and piezometric wells, the procedure for putting wells into operation and maintaining certain allowable operating modes of production wells [1, 2, 3].

As a result of research by A.F. Beznosikov, F.A. Trebin, Yu.F. Makogon, K.S. Basniev, A.Kh. Mirzajanzade, O.L. Kuznetsov, Z.S. Aliev, S.F. Mulyavin, I.M. Fyk, E.I. Khripko, V.A. Amiyan and other scientists considered issues related to the exploitation of gas and gas condensate fields.

## **II. EXPERIMENTAL RESULTS**

Analysis and results. The operation mode of wells is influenced by many factors on which the technological modes of operation of gas and gas condensate wells depend. (Fig. 1.)

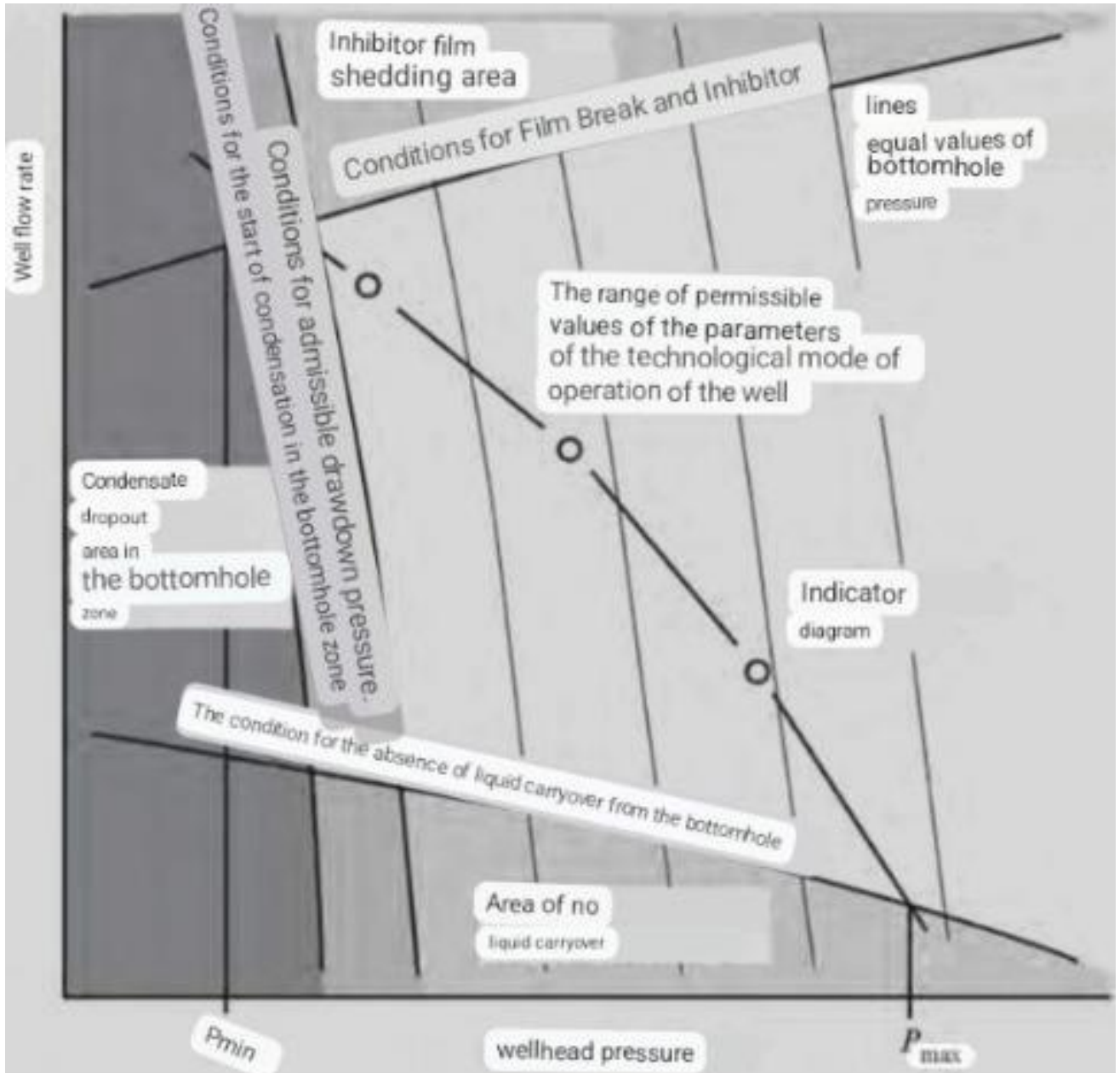


**Figure - 1. Factors affecting the operation mode of gas and gas condensate wells**

As the reservoir is depleted, bottom and contour water advances, gas production decreases over time, and reservoir and bottomhole pressures decrease, there comes a time when the set mode is not provided, and it is necessary to change the selected technological mode of operation. The newly established technological mode of operation is also justified, as in the beginning of the field development.

As a rule, the working flow rates [4, 5] of wells for gas are within the limits between the maximum allowable and the minimum required (Fig. 2.).

It is necessary to justify the flow rate of the well, which would be within the allowable values and ensure planned gas extraction with minimal pressure losses in the wellbore.



**Figure - 2. Limits of technological regulation and limitation of parameters of the technological mode of operation of the well**

Regardless of the development conditions, when establishing the optimal technological operating conditions, it is necessary to adhere to the following principles. (tab. 1.)

**Table 1.**

Principles for establishing optimal technological modes of operation	
1	Fully take into account the geological and commercial characteristics of the deposit
2	Fully take into account the technological and technical characteristics of downhole and surface equipment
3	To guarantee the reliability of work within the established time limits of the entire complex of systems of the reservoir-beginning of the gas pipeline
4	It is rational to use the natural energy of gas-bearing, oil-bearing (in the presence of an oil rim) reservoirs and water-pressure system
5	Fully meet the requirements of the law on environmental protection and rational use of natural resources
6	To ensure the highest productivity of gas wells in the period of development of the deposit provided for by the plan
7	Timely change previously established, but unsuitable at this stage of development, technological modes of well operation to new modes
8	Consider as much as possible the possibility of removing restrictions that reduce well flow rates, and provide for measures to intensify gas production
9	Ensure planned gas production with minimal capital investment and operating costs

With full and unconditional observance of the above principles of establishing the technological mode of operation, rational development of gas and gas condensate fields will be achieved [6].

Studying the nature of the operation of each well, examining the state of the wellhead and columns during underground repairs, as well as when performing work on the impact on the bottomhole zone, provide valuable information that is taken into account when establishing the technological mode of operation of individual wells and the entire deposit as a whole.

### III. PROPOSED METHODOLOGY AND DISCUSSION

Under the technological mode of operation of wells is meant the maintenance at the bottom of wells or surface facilities of the specified conditions for changing the flow rate, pressure, temperature, carried out by regulating them, and ensuring compliance with the rules for protecting the subsoil, the environment and trouble-free operation of wells and surface equipment. These conditions, called the technological regime of the well, are different depending on the geological and operational characteristics of each field, the properties of gas, condensate and water, the conditions for supplying gas and condensate to consumers, as well as the specified gas conditions [7, 8, 9, 10].

When substantiating the technological modes of operation of gas and gas condensate wells, three trends are distinguished:

1. Well operation mode should correspond to 10+15% value of free well flow rate.
2. The mode of operation must correspond to a linear relationship between the pressure gradient and the filtration rate, i.e. the condition when the gas inflow equation is described by the Darcy law for gas, in order to save gas energy in the development process (“energy-saving” flow rate).
3. The operating mode of each well should be justified taking into account the possibility of deformation, destruction of the bottomhole zone, the formation of a sand-liquid plug within the perforation interval, the formation of a cone of bottom water (oil in the presence of a rim), hydrates in the bottomhole zone and in the wellbore, corrosion of equipment, etc.



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## IV. CONCLUSIONS

In conclusion, we can say that taking into account the complications in the operation of gas and gas condensate wells allows you to correctly determine the technological modes of operation of wells, correctly conduct production, achieve high productivity of wells and comply with the requirements of subsoil protection.

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