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THE THEORETICAL FOUNDATIONS OF TECHNOLOGY FOR STUDYING GAS SHOWINGS DURING WELL DRILLING

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Annotation. *The ways of improving the elements of the methodical approach to the study of gas manifestations in the process of drilling wells are considered. It is assumed that drilling takes place under conditions of low drawdown on the formation, while the pressure from the side of the drilling fluid on the formation is less than the formation pressure, and the gas inflow is determined by filtration processes in the studied section. Filtration processes are described by classical formulas of underground hydrodynamics. The main causes of gas manifestations arising in the process of drilling wells are considered. The necessity of their study in order to obtain valuable geological information is indicated. An alternative approach to ways to eliminate them is shown.*

Key words: *gas shows, well testing, search sign for oil and gas.*

In the process of exploration drilling of wells, gas and oil shows are one of the signs of the presence of oil and gas in the geological section. Elimination of gas shows instead of studying and managing them leads to the loss of geological information. Moreover, it can become an impetus to complications, and in some cases becomes the cause of complex emergencies. The methods of its research are currently little developed and require further improvement. This is especially true of technical means for their study. The tasks of developing technologies and technical means were practically not solved for gas shows in the conditions of flushing wells with a sealed wellhead (i.e., with excess pressure at the wellhead). And there are many such cases in industrial practice.

Unfortunately, in numerous scientific and technical works, the task is to eliminate oil and gas manifestations, even the reasons for the saturation of the drilling fluid with gas.

Such a requirement to eliminate oil and gas shows, instead of managing and studying them, leads to the cutoff and, as a result, the loss of extremely important geological information about the oil and gas potential of the reservoirs and the reservoir pressure in them. This geological information primarily indicates the depths of oil and gas saturated formations.

In most cases, the fight against oil and gas shows is carried out by increasing the density of the drilling fluid. But this leads to a significant excess of bottomhole pressure over reservoir pressure. In turn, this means a deterioration in reservoir properties in the downhole part of the formation, skipping productive horizons, a decrease in rate of penetration, an increase in complications and accidents in the drilling process. That is, the consequences can be unpredictable and undesirable.

To prevent this, methods are proposed for recognizing the reasons why gas shows occur and appropriate technological actions to eliminate them. The reasons may be: gas filtration to the wellbore, provided that the formation pressure exceeds the bottomhole pressure; the phenomenon of degassing of rock sludge during its transportation to the surface; presence of artificial runway zones; gas diffusion; capillary and osmotic flows, etc. It is shown that in the case of gas filtration before the bottomhole, it is possible to reduce the intensity of gas steam by increasing the flow of the mud pump and reducing the time of tripping operations and downtime of the well without flushing. After completing the study of the gas show and determining the reservoir pressure, the value of the drilling fluid density should be brought into line with the value of the reservoir pressure gradient. If diffusion

processes are the cause of gas-steam, then in this case the intensity of gas-steam does not depend on the value of the bottomhole pressure and therefore the density of the drilling fluid will not affect its intensity in any way. In this case, after the drilling is stopped, the gas content stops. And this can be avoided by reducing the mechanical speed of drilling and increasing the flow of the mud pump. If the gas show is the cause of the formed zone of abnormally high reservoir pressure, then it is impossible to reduce its intensity by increasing the density of the flushing liquid, since it practically does not affect the gas content index. If the cause of the gas show lies in the presence of diffusion, then its intensity can be reduced by reducing the density of the flushing fluid and avoiding downtime of the well without flushing. Compliance with such an approach to the study of gas shows will expand the list of geological information about the objects under study.

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