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GAS METHODS FOR MAINTAINING RESERVOIR PRESSURE AND ENHANCED OIL RECOVERY

Bekjonov Rozisher Soatmurodovich
Mavlanov Zafar Allanazarovich
Meylieva Kibriyo Oybekovna
Karshi Engineering and Economic Institute
Department of "Oil and gas business" Karshi city, Uzbekistan country

Annotation
To maintain or restore formation pressure by injecting gas or air into the formation, oil-saturated formations with steep flanks, good permeability, homogeneous rock composition and low viscosity are the most suitable objects.

Main Part
Compressed gas or air in the layers is pumped into the gas cylinder or, if it is not available, into the upper part of the dome. In the latter case, the purpose of gas driving is to artificially form a gas ball and thus transfer the pile operation mode to a gas compression mode.
If the flank slope is less than 15, the rock permeability is low, and the oil is heavy, gas injection to maintain formation pressure may be ineffective.
In this case, it is very difficult to balance the gas work and it goes to the user wells without doing any useful work.
The amount of gas being pumped should be such that the required layer pressure is maintained for a long time. Ideally, this amount should be equal to or more than the volume of product (oil, gas, water) extracted from the formation under formation conditions. In practice, this is difficult to achieve. Even if 70-80% of the above-mentioned volume is returned to the formation through gas, the process being carried out will be satisfactory due to the slowing down of formation pressure.
In order to maintain the pressure of the layer at the beginning of operation, gas or air injection requires the construction of compressor stations designed for high pressure. Because the driving pressure must be 10-20% higher than the formation pressure. Equipping mines with such compressor stations requires large capital costs and labor. Therefore, in most cases, they are limited to maintaining formation pressure at the level of pressure provided by standard compressors (5-12 MPa), and also start gas injection into the formation during the last period of operation. Because the gas must be compressed to a pressure higher than the formation pressure, gas injection into the formation is less efficient than water injection.
Gas is pumped when there are difficulties and problems in driving water into the layer or when it is not possible (when there are layers of suffocating clay in the water, when the permeability of the driving wells is not sufficient).

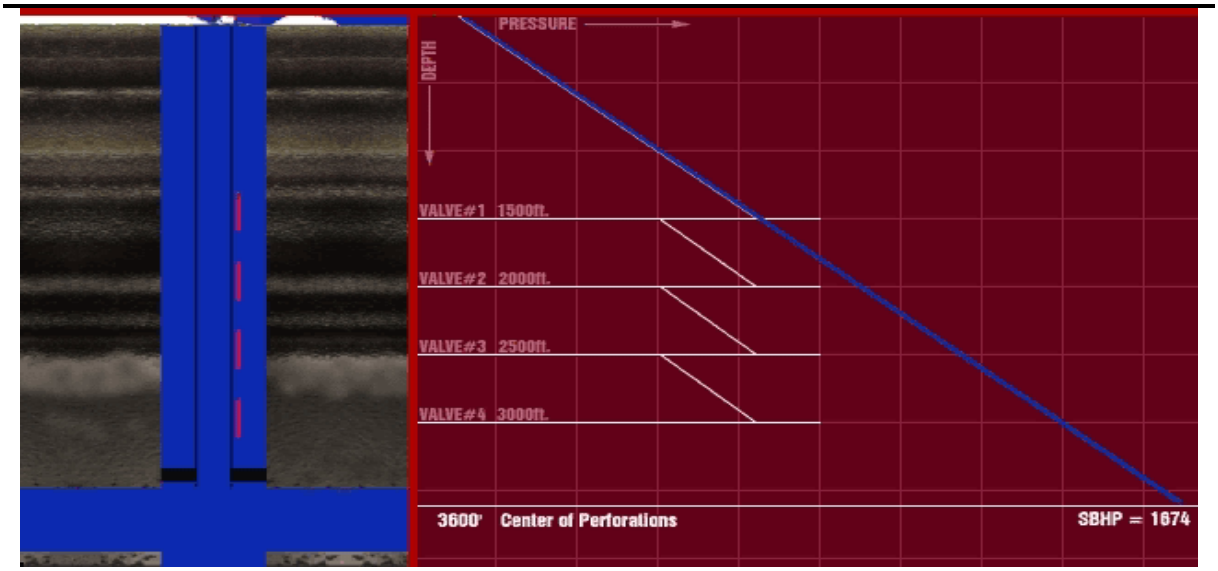

Figure 1. The process of leaking gas in an experimental well with insufficient receptivity.

Gas for driving can be obtained from satellite gas coming out together with oil, from natural gas from neighboring gas fields, from the main gas transmitter.
Disadvantages of air as a working agent;
1) Prolonged contact between oil and air leads to partial oxidation of oil and decrease in mobility.
2) Blowing of air spoils the quality of formation gas.
3) An explosive mixture can be formed due to the increase in the amount of air in the received gas.
4) Under the influence of oxygen in the air, especially in the presence of water, strong corrosion occurs in the underground equipment of pipes and wells.

Premature release of gas from used wells reduces the efficiency of the compression process and increases energy costs. They are determined by controlling the gas factor of the wells. In order to maintain formation pressure, it is carried out by controlling the process of gas injection into the formation, accurate calculation of the amount of gas being driven, monitoring changes in formation pressure, coordinating the movement of the gas-oil connection. This coordination is carried out by redistributing production from wells with increased gas factor across the regions or completely stopping some of them.

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