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IMPLOSION METHOD FOR STIMULATION OF INFLOW FOR OIL AND GAS WELLS

A serious problem when drilling oil and gas wells is the violation of the reservoir properties of the productive formation. This occurs as a result of the penetration of particles of destroyed rock and washing fluid into the formation, as well as plastering of the well walls. All this leads to a decrease in flow rate, a reduction in the drainage area and the service life of the well. The consequence of this is additional time and money spent on repair work, an increase in the cost of operating the well, and breakdowns of pumping equipment.

The first two problems are caused by hydrogeological factors that need to be carefully analyzed and used as efficiently as possible, but which are almost impossible to influence.

But the problem of deterioration of the reservoir properties of the productive formation can and should be solved in several aspects. All measures aimed at solving this problem are divided into two groups: those carried out directly during the drilling process at the time of opening the productive formation and those carried out after completion of drilling and installation of the filter [1].

Activities carried out during the drilling process include: selection of drilling fluid that best matches the reservoir properties of the formation; opening the formation at minimal repression or even depression, which avoids the penetration of polluting particles into the formation; selection of drilling tools that reduce the plastering effect; selection of drilling technology that ensures minimal contact time between pollutants and the productive formation [2].

After drilling is completed, productive horizons are developed, which consists of restoring their natural permeability or artificially increasing it, causing inflow into the well and forming its water receiving part [3]. Well development is carried out in the following ways: flushing wells through the working surface of the filter; gelling and swabbing; annular (behind-filter) flushing; pumping with an airlift or hydraulic elevator; hydraulic pulse methods of exciting shock waves in the interval of an aquifer, etc.

Let us note the great importance of the fact that in certain geological conditions, by influencing the productive formation, it is possible not only to clean it of contamination resulting from drilling a well, but also to increase its permeability. Thanks to this, wells in which the optimal development method has been chosen and the process itself has been carried out efficiently will have a high flow rate, a large feeding area, and therefore will operate with the required productivity for a long time. Thus, modern methods of well development, applied in accordance with local geological and hydrogeological conditions, make it possible to repeatedly increase the amount of extracted water [4].

The variety of development methods is due to the fact that in different geological conditions they show different effectiveness. There is no universal method for developing aquifers. Therefore, a thorough analysis of the geological conditions of a particular groundwater deposit and the choice of the optimal development method for these conditions is an urgent task, the solution of which is of great practical importance.

During implosion, a low-pressure area is created in the productive part of the well, which at a given moment instantly connects with the near-well area of the formation, creating high depression and a sharp influx of hydrocarbons into the well at a speed of up to 200 m/s. Such a jet tears off the clogging material from the place where it is fixed - from the surface of the filter,

from the well wall from deep areas of the near-well zone - and carries it into the well, from where it is subsequently removed by known methods: washing, gelling, airlift.

Thus, the known device uses a tubing string that includes a packer and has a valve at the end. The column is lowered into the well inside the production and filter columns. When lowering, the valve does not allow the fluid filling the well into the tubing. An empty column is suspended above the face. Above the filter column, a packer is made, which separates the near-well zone of this column from the annular space between the tubing and the casing. After packing, the tubing string is supported on the bottom, as a result of which the valve opens, the productive zone of the well is connected to the air-filled internal space of the tubing, and an implosion effect on the formation occurs. Reservoir hydrocarbons flow into the tubing, which is removed after unpacking. Next, pumping is carried out using an airlift.

In foreign countries, the implosion method is implemented by lowering a metal capsule with a glass lid on top into a well [5]. The air is pumped out of the capsule, creating a vacuum in it - a pressure below atmospheric. After the capsule is lowered into the productive zone of the well, the glass cover of the capsule is destroyed by the explosion of the detonator. With this method, the time of implosion action is sharply reduced, which is very favorable from the point of view of decolmatation. Following the depression on the formation, it is also subjected to the impact of a hydraulic shock from the fall of a column of flushing liquid located above the capsule when it fills the space occupied by the capsule. The bubble of air and gas remaining in the capsule is compressed, and later, when the shock action is replaced by hydrostatic pressure, it expands and, as a result, a process of damped oscillations is added to the initial implosion shock. The advantage of the method is a very high initial inflow rate, the disadvantage is a short inflow time due to the relatively small volume of the capsule it fills. It should be noted that the implosion effect not only affects the aquifer, increasing its permeability, but also has an effect on the casing strings, which can lead to their crushing and violation of the integrity of the casing string. Thus, it is very important to correctly choose the parameters of the implosion effect in order to maximize its positive effect and prevent the development of negative phenomena.

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