



“GEIZER EOR” SET OF EQUIPMENT FOR ACOUSTIC OIL AND GAS WELLS STIMULATION

Problems of oil recovery and permeability reduction

Reduction of the permeability of the bottom hole zone can depend both on the properties of the rock, and on the mode and technology of the well operation. The most frequent reasons for the reduction in well productivity may be:

- Clogging of bottom hole formation zone during the course of drilling the well
- Clogging of bottom hole formation zone during the well operation
- Mud cake formation in the perforation channels during the jet perforation
- Congestion of the perforation channels in the process of the well capping and subsequent clogging



Problem solution

ACOUSTIC OIL AND GAS WELLS STIMULATION TECHNOLOGY WITH THE USE OF “GEIZER EOR” SET OF EQUIPMENT

This is a **modern, high-tech, non-reagent**, safe geophysical method of **controlled** and selective **impact** on the formation and bottom hole formation zone for the intensification of oil inflow and **increase of oil recovery** applicable in a wide range of geological and technological conditions of field objects (formation pressure - up to 50 MPa, temperature - up to 180°C), with a **long** (0.5-2 years) and significant (from 20 to 300%) **effect** .

The method is **defect-free** for the formation and wells and is **environmentally friendly**, and can also be easily combined with other known techniques of **enhanced oil recovery**.

This method also does not require the disassembling of tubing equipment.



Benefits

The advantages of the acoustic oil and gas wells treatment are:



Extension of the term of effective field operation due to reduction of the clogging of bottom hole formation zone



The possibility of a one-time / periodic and continuous / permanent treatment of an exploited well without its long-term shutdown



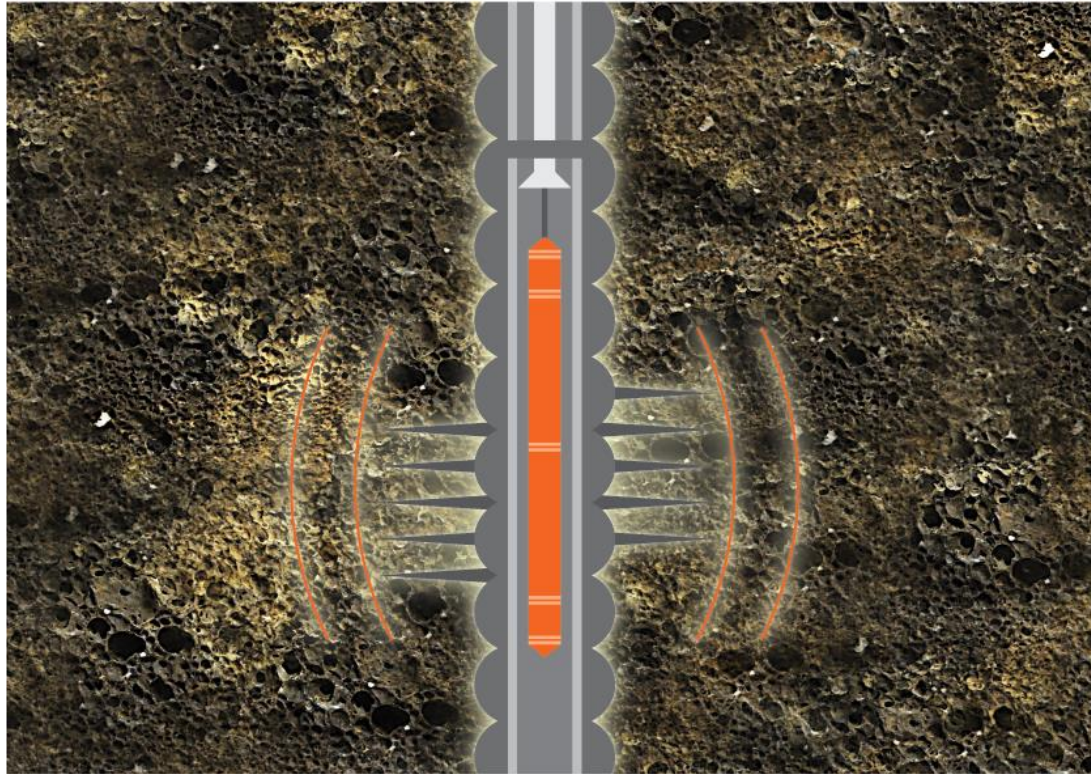
Increased permeability of the bottom hole formation zone due to changes in the structure of its porous space



Simple integration of technology into activities during major overhaul of the well, and in many cases **without major overhaul**

Effect of ultrasonic waves on the formation

When the powerful ultrasound interacts with the porous medium of the bottom hole formation zone, the following occurs:

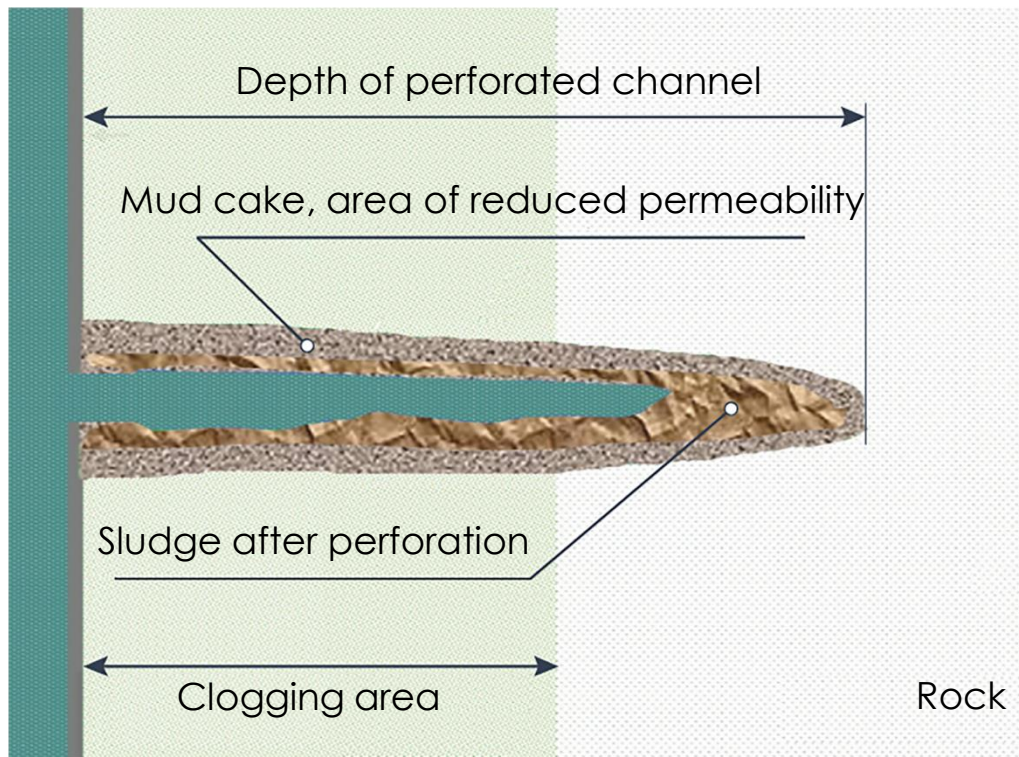


- Destruction of salt deposits on the walls of capillaries due to acoustic vibration.
- Acoustic degassing of liquids with elimination of gas plugs in capillaries.
- Destruction of the braking electrostatic layer in the capillaries.
- Reduction of surface tension in capillaries.
- Decrease in viscosity of liquids.
- Creation of large compressive and tensile pressure gradients on a scale, corresponding to the pore size;
- Complex effect on the reservoir with heat and high alternating pressure gradients

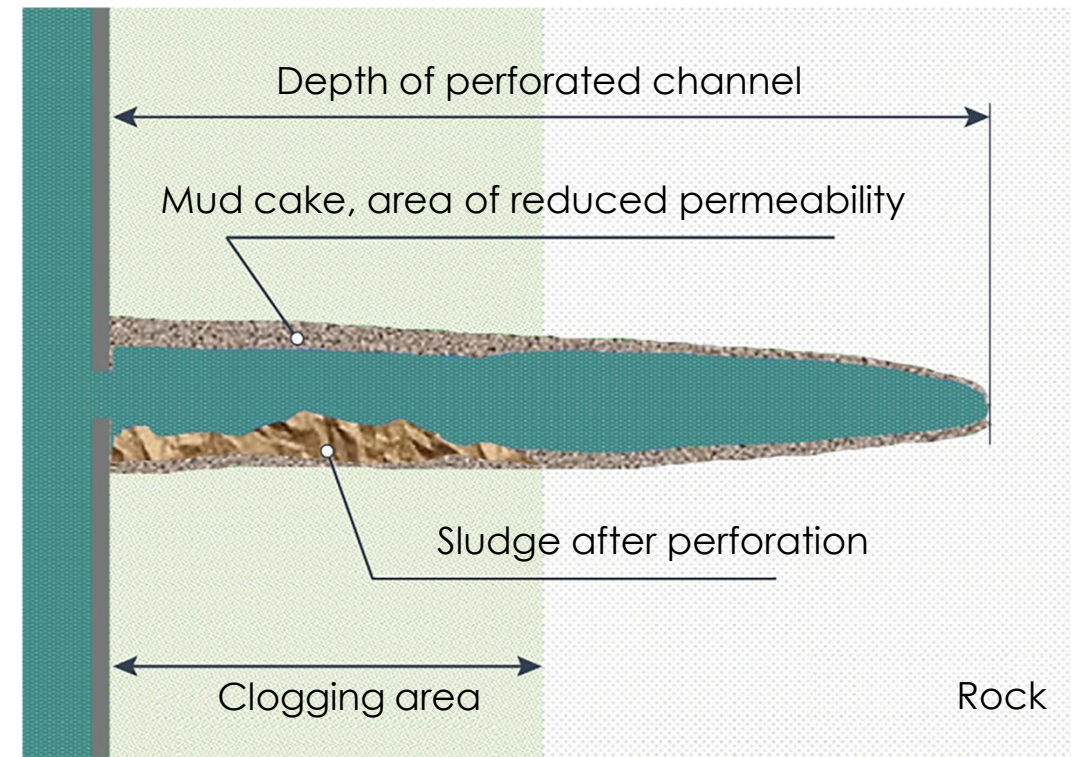
✓ These physical processes lead to an increase in the fluid flow rate in the capillaries by 25-300%, both by increasing the permeability of the capillaries, and by improving the properties of the liquid itself.

Result of application

- ✓ A significant increase in the drainage area of the perforated channels increases the flow rate of the well
- ✓ In addition to cleaning from the mud cake, the damaged bottom hole zone is also cleaned



BEFORE



AFTER

Principle of operation

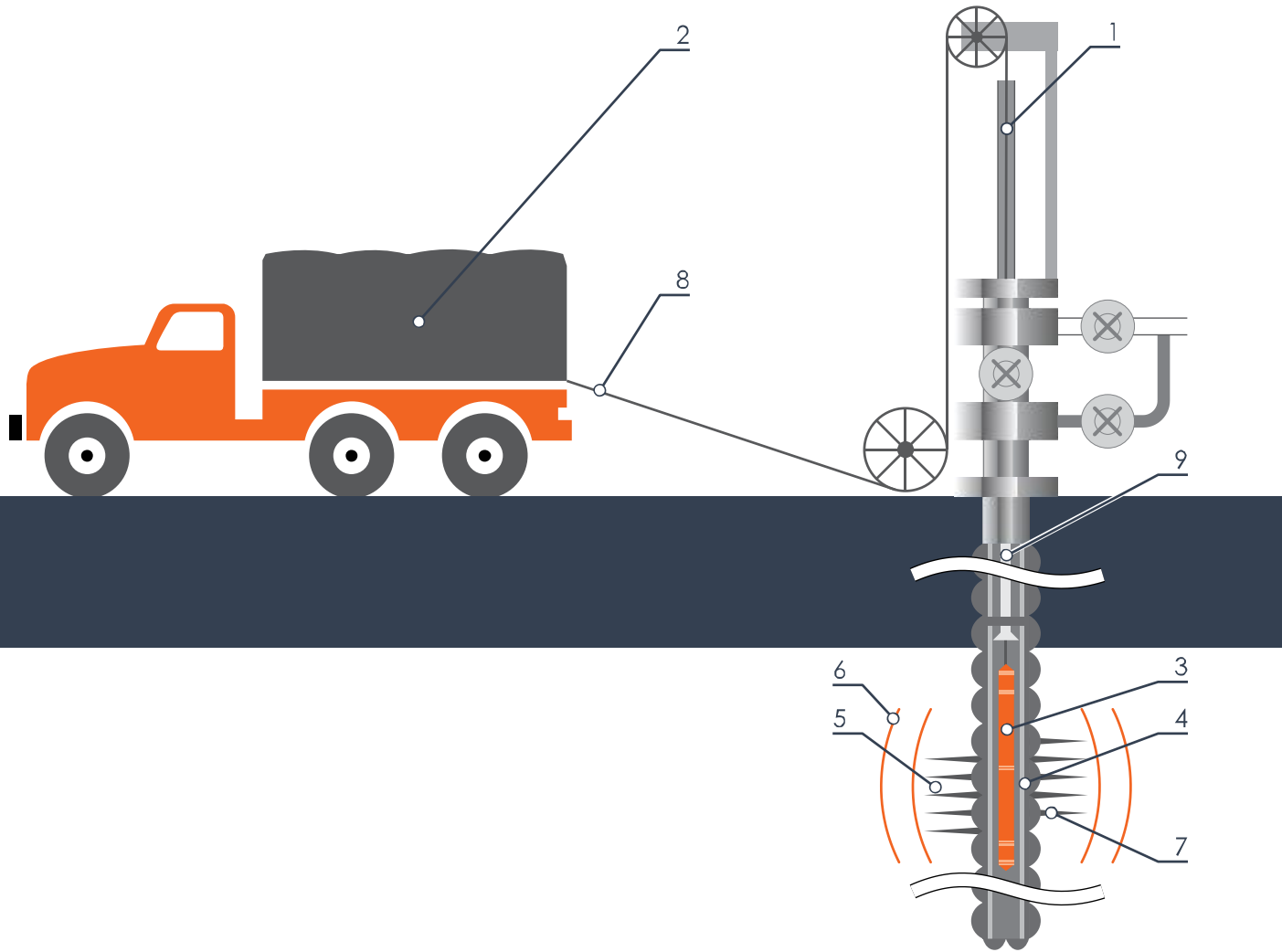
"Geizer EOR" the set of acoustic equipment consists of **an above-ground power supply** and a **borehole acoustic emitter**.

The borehole acoustic emitter is lowered on the logging cable through the lubricator and the tubing string in the well filled with liquid above the perforation zone. When installing the emitter at the level of the perforation zone, it is supplied through cable with an alternating current of up to 300 V with a frequency of 10-60 KHz, generated by multifrequency power supply.

Due to the reverse piezoelectric effect the emitter excites a wave process with a directional pattern that varies according to a given algorithm and a specific power of up to 10 W/cm² into the environment (the radius of effective impact of the equipment used, taking into account side effects, reaches 5-8 m).



Principle of operation



- 1) lubricator;
- 2) wireline truck;
- 3) borehole acoustic emitter;
- 4) casing;
- 5) oil-bearing formation layer;
- 6) area of acoustic impact;
- 7) perforation zone;
- 8) logging cable;
- 9) tubing.

Implementation

To process the well, a standard geophysical batch is required, This batch includes personnel and the following technical means:

1. A mobile log-processing laboratory equipped with a collar locator and a gamma-ray logging tool.
2. Lifting-logging station, completed with a 3-core geophysical cable up to 6000 m long and 0.75 mm cross-section. The diameter of the cable lug should be 36 mm.
3. Lifting-lubricating unit.
4. 220V power plant at frequency 50, 60 Hz and power not less than 4 kW.

Performance time is 8-12 hours. The average time of treatment of the well perforated zone is 0.7 m/h.

The maintenance of the set of equipment is provided by two operators.



Specifications

“Geizer EOR” set of equipment for acoustic oil and gas wells stimulation

Maximum power consumption, W	3600
Power supply input frequency, Hz	50/60
Power supply voltage, V:	220
Power supply maximum output voltage, V	600
Maximum sound intensity level , W/cm ²	10
Power supply output frequency, kHz	10-60
Maximum depth of zones for ultrasonic treatment, m	6000
Maximum temperature for treatment, °C	180
Maximum operating static pressure, MPa	50
Geometrical dimensions of the borehole acoustic emitter:	
length, mm - not more	1000
diameter, mm - not more	45
weight, kg – no more than	10

Comparison with existing analogues

In comparison with existing analogues of acoustic EOR systems on the bottom hole zone of oil and gas wells, the proposed “Geizer EOR” set of equipment has the following advantages:



Ensuring the optimum intensity of acoustic EOR when working in wells **up to 6000 m** deep



Ensuring the optimal intensity of acoustic emission when working in wells with a temperature in the zone of treatment **up to 180°C**



The production life after well treatment is **from 6 months to 2 years**



Lot Azerbaijan

