NEW MATERIALS AND TECHNOLOGIES IN THE INSULATION OF GAS WELLS IN THE URENGOI FIELD

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Production activities on Senomanian deposit of Urengoy and Yen-Yahinskoye areas of Urengoy oil, gas. condensate field (UNGKM) on the modern stage of development are accompanied with problems typical for the later stage of gas fields development.

Complicated geology of Senomanian productive horizon, considerable reduction of formation pressure (up to 4 times) and lift of gas-water surface (GVK) on this object, which is being developed 20 or 30 years, are determining factors for reduction of productive characteristics of wells. Repair and insulating work for prevention and elimination of reservoir water entry in Senomanian gas wells on the initial water flood stage of Senomanian deposit of Big Urengoy fields were carried out by the following technologies:

- creation of emulsive screens with taking into account relative permeabilities of water and gas reservoir rock;
- restriction of formation water entry pore sediment formation;
mounting of cement bridging with cutting off of lower part of water-encroached producing formation in the perforated interval;

- mounting of cement bridging with cutting off of lower part of water-encroached producing formation in the perforated interval with pumping of different water-shutoff materials.

On the modern stage of flooding of the Senomanian deposit of Big Urengoy fields the above-listed technologies ensure water-shutoff effect, but they have a number of defects:

- They have no selectivity: during the repair and insulating work the water-shutoff materials are injected in the open perforated interval of the producing formation, what leads to the mudding not only of the water-encroached formation interval but also of its gas-saturated part, following a mudding the output of well after repair and insulating work is lower than in posse;

- mounting of cement bridging with cutting off of lower part of water-encroached producing formation decreases its thickness, and because of the loose contact between the cement stone and the rock, the wells will be encroached with water in the casing-string-borehole annuity.

Increase in the number of water-encroached gas wells standing idle in the changed geological-technical conditions, imperfection of early used technologies of repair and insulating work require the search of new materials and the development of new technologies of repair and insulating work. Basic requirements asked by them consist in the creation of water-shutoff screens direct in the water-encroached part of the producing formation with keeping of collecting properties of gas-saturated intervals.

Taking into account the asked requirements the authors in OOO Gazpromdobycha Urengoy developed and implemented the technologies of elimination and restriction of reservoir water entry in the well with the implementation of new insulating materials on basis of natrium naphthenate (HMH-400), which were preliminary tested in the laboratory on the models of the reservoir rock of Senomanian deposit. Developed technologies secure the selective insulation of
water-encroached intervals of the producing formation by cyclic injection of HMH-400 and chloride solutions direct into the water-encroached part of the formation. Basic operations are carried out in accordance with following procedure:

- a distance from collar up to bottomhole is measured by means of a pattern. The well is killed by serial injection of a design volume of blocking solution and fluid for killing in the pipe space and the downhole equipment is pulled up.

- a cement bridging is mounted, it insulates the perforated intervals of the producing formation, prevent the falling of technological fluids and insulating materials into the producing gas-saturated part of the formation and recondition impermeability of cement stone behind the flow string in the perforated interval.

The well is closed for the time of cement slurry thickening (OZC).

- The cement bridging is drilled up to depth of the water-encroached part of the formation.

- Special holes in the flow strings in the water-encroached interval are perforated for injection of waterproof composition.

The solution of calcium chloride is injected into the water-encroached part of the formation through the special holes and HMH-400 through the separating bumper. This procedure of solutions injection is carried out in several cycles, in which of them the following sequence is kept: HMH-400 → bumper → calcium chloride → bumper. Further a cement bridging is mounted for sealing of special holes.

- After the time of cement slurry thickening the cover of the cement bridging is determined and strength test is carried out.

A repeated perforation of the early opened producing intervals of the formation is carried out. Further the well is developed with the help of gas booster (UNG-8/15 gas booster) till the achievement of thermobaric and discharge parameters of the well, which are necessary for feeding into the field gas collector (GSC). Further the well is put into operation in the field gas collector (GSC).
Developed technologies allow to carry out selective water encroached intervals insulation of productive stratum, take into operation inactive wells and provide gas production planned level. For that, usable materials differ in high manufacturability, toxicologic and ecological safety. After RIR realization 100 delayed wells were commissioned, water-inflow was eliminated in 29 wells but productive characteristics of these wells after repair works do not allow steadily to work them in gas collector together with neighbour more productive cluster wells. Complementary gas production for five years makes up about 4,2 bcm and economic effect makes up more than 1,0 mrd roubles.

New constructed materials and technologies of repair-insulation works can be applied not only on the fields of OOO Gazprom dobycha Urengoy but also on other gas fields of OAO Gazprom at the late development stage.

Key words: technology, know-how, production, operation.

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