

Section 3. Technical sciences

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MONITORING OF THE TECHNOLOGICAL REGIME OF WELLS AND BOREHOLE EQUIPMENT

Abstract. to monitor the operation of wells, control and measuring equipment and devices for taking wellhead samples of extracted products are installed. The binding of wells should ensure the conduct of a complex of studies: individual measurement of the flow rate of liquid and gas, waterlogging, (echometry, dynamometry, descent of deep instruments, etc.).

During the operation of wells, their research is carried out in order to monitor the technical condition of the production column, the operation of equipment, to check the compliance of the parameters of the wells with the established technological regime, to obtain information necessary to optimize these modes.

Keywords: hydro-gas dynamics, inflow profile, bottom-hole zone, backwater overflow, oil and gas saturation, wellhead pressure.

In order to study the nature of changes in the oil and gas value of formations and for the most complete recovery of reserves in the process of developing oil and gas deposits, it is necessary to carry out complex hydro-gas dynamic, field-geophysical and laboratory studies.

Control over the development of oil and gas deposits, the condition and operation of wells and downhole equipment should include the following minimum of research on existing producing wells:

- systematic and periodic control measurements and determinations of reservoir, bottom-hole and wellhead pressures. Bottom-hole pressure should be measured in the form of one-time studies for all new producing wells and after they are out of repair, as well as systematically in existing wells at least twice

a year. Determination of reservoir pressure should be carried out in the form of one-time studies on all wells that have opened productive formations (including in the legal area), after their exit from drilling or repair work and systematically in operating producing wells at least once a half-year; studies by the method of established sampling should be carried out as one-time for all new wells, as well as for existing wells before and after repairs, geological and technical measures (GTM) related to changes in the state of the bottom-hole zone, and systematically for existing producing wells at least once every two years;

- studies of wells by the pressure recovery method are carried out in the form of one-time studies on all new producing wells, as well as wells that have

come out of repair and systematically on existing producing wells at least once every two years.

In addition, the dynamics of changes in current and accumulated oil, water and gas production is monitored for the deposit as a whole, for individual layers, sections, and individual wells [1]. For wells opening multi-layer objects, pressure recovery studies should be carried out simultaneously with studies of the inflow profile by the geophysical service:

- the study of inflow profiles should be carried out as one-time studies on all new producing wells and after GTM associated with the impact on the bottom-hole zone, and systematically on existing wells equipped for the production of depth measurements at least once a year.

- These studies can be carried out either in combination with studies using the method of steady-state sampling and pressure recovery, or independently:

- monitoring of the position of the WOC, GOC and GWC measurements of oil and gas saturation should be carried out using a set of geophysical methods for observation wells, wells of the reference network at least once a half-year, as well as for producing wells in the GTM process;

- determination of the sources and intervals of watering, opened by perforation, is carried out both in the process of studying the inflow profiles, and independently when watering the production of wells;

- determination of the temperature along the trunk of a working well is carried out selectively for individual wells at least once a year;

- determination of reservoir and bottom-hole temperature is carried out in the process of measuring bottom-hole and reservoir pressure at least once a half-year;

- inspection of the condition of production columns should be carried out according to the fund of producing wells in the process of repair, GTM and suspected defect formation. The study reveals the damage to the columns, the condition of the cement ring and the location of the column flows;

- revision of gas lift valves and determination of the place of gas input into the lift is recommended to be carried out after the descent of the elevator and in case of a sharp decrease in the flow rate of the well;

- deep oil sampling and their subsequent analysis should be carried out on specially selected reference wells, the total number of which should be at least 5% of the total fund of producing wells;

- it is recommended to take wellhead samples of oil, gas and condensate to determine physico-chemical properties in surface conditions once a year through the wells of the reference network.

The analysis of geological and field materials shows that there are a number of wells in the operational fund with hydrodynamic imperfections in the degree and nature of the opening of the productive reservoir. When drawing up a project for the development of gas condensate deposits of the field in order to increase the productivity of wells, it is recommended to determine the objects of completion and shooting of the productive horizon in the gas environment with enhanced charges [2].

To increase the productivity of low-flow wells, it is recommended to conduct clay acid treatments of the bottom-hole zone of the formation and hydraulic fracturing.

Based on the obtained positive results of using the method of simultaneous operation of wells, the Altyguyi deposit in the pipe and annular space is also recommended to continue its implementation in low-flow wells.

During the operation of wells, their research is carried out in order to monitor the technical condition of the production column, the operation of equipment, to check the compliance of the parameters of the wells with the established technological regime, to obtain information necessary to optimize these modes.

- a) the technical condition of the well and the installed equipment is checked (tightness of the cement stone, casing and tubing, condition of the bottom-hole formation zone, contamination of the

borehole, pump supply, operation of valves installed at depth and other devices);

b) the compliance of the operating parameters of the installed equipment with the production capabilities of wells and the specified technological regime is checked;

c) the reliability and operability of the equipment units is evaluated, the inter-repair period of the equipment and the well is determined;

d) information is obtained that is necessary for planning various types of repair and restoration and other work in wells, as well as for establishing the technological effectiveness of these works.

The types, volume, and frequency of studies and measurements in order to monitor the operation of equipment for all methods of well operation are established by oil and gas production departments together with research organizations and geophysical enterprises in accordance with the recommendations of project documents and approved by the management of the association [3].

Research on monitoring the operation of producing wells should be carried out in full compliance with the safety rules in the oil and gas industry, in compliance with the requirements of subsurface and environmental protection.

The documents regulating the scope, methods and technology of research are the existing mandatory complexes, instructions and other guidance documents on technological, hydrodynamic and laboratory studies, observations and operations.

Materials for monitoring the operation of equipment are systematically analyzed and used by the engineering service of oil and gas producing enterprises to ensure the established technological modes of operation of the well.

All primary research materials are subject to mandatory storage throughout the entire period of well operation (except for echograms and dynamograms, the shelf life of which is set at least three years).

The comprehensive implementation of the above measures will allow maintaining gas production at the Altyguyi field at the project level [4].

For the idle and inactive fund of oil wells and for the fund of wells under development after drilling, it is recommended to carry out works on their restoration, development and commissioning: well returns to the above and below horizons, water isolation works based on a complex of geophysical studies of wells (GSW), inspection of production columns, extraction of emergency tubing and packers. All work on the wells should be carried out taking into account the GSW materials carried out during the repair process. During repairs, it is necessary to apply new technologies ("Slickline" technology, flexible tubing, etc.) [4].

The timing of repair work will be determined by many factors, both geological (the development of the operated facility, the absence of nearby wells at the return facility, the results of testing it at this site, etc.) and technical (the condition of the well, the availability of the necessary equipment, etc.), therefore, it is not possible to predict them for specific wells in the future. The possibility and expediency of the work, and the timing of their execution will be determined during the operation of the field specifically for each well.

Recently, a large amount of work has been carried out at the Altyguyi field on the geochemical determination of the composition of oil, gas and condensate, as well as hydrodynamic studies. The results obtained made it possible to determine the reserves of condensate and free gas, as well as their calculated parameters.

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