ANNOTATION

Dissertation for the degree of Doctor of Philosophy PhD on specialty 6D070800 - Oil and gas business Sabirov Bolatkhan Faizullaevich «Development of design parameters for the drilling tool for core sampling from oil and gas wells»

General description of work.

Dissertation work of the doctoral candidate Sabirov BF is devoted to research in the development of drilling equipment for the selection of representative core from fractured rocks of medium and high hardness. This work is especially relevant for prospecting and exploration of oil and gas fields, where well drilling with coring takes an extremely important role. Despite the great successes of geophysical exploration methods, they nevertheless remain indirect, require interpretation and interpretation of the obtained data and can not replace the receipt from the bowels of a visual geological sample - core. The author noted that the study of core samples makes it possible to design rational drilling regimes, select the most effective types of rock cutting tools, and develop new designs for drilling equipment.

The object of the study is the process of core sampling in fractured rocks of medium hardness. It is known that under these conditions in many cases it is not possible to obtain a representative core.

The subject of the study is the analysis and development of design parameters of existing shells for core sampling when drilling fractured rocks from oil and gas wells.

The urgency of the work is obvious in view of the importance of obtaining reliable geological information by examining visual geological samples from wells, and also because of the large footprint of exploratory wells being drilled for oil and gas.

The purpose of the study is to develop design parameters of the drilling tool designed to select a reliable, representative core when drilling fractured rocks of medium hardness and hard.

Objectives of the study. To achieve this goal, the following tasks were accomplished:

- analysis of the influence of various factors on the selection of representative core when drilling oil and gas wells;
- analysis of design parameters of existing projectiles for core sampling when drilling fractured rocks from oil and gas wells;
- investigation of core formation in fractured rocks during drilling of oil and gas wells by existing projectiles;
- laboratory research and development of a shell projectile with a removable soil and ejector knot of a ring type.

Scientific novelty of the thesis:

1. On the basis of experimental dependences, design parameters of the device for core selection equipped with a circular ejector device with a removable core receiver are developed and substantiated.

2. Using the example of a developed core sampling device equipped with standard PDC 139.7 / 52 drill heads (outer diameter -139.7 mm, diameter of the drill core - 52 mm), it was shown that the drilling mud consumption, equal to 18 kg / s, will ensure proper cleaning of the well from the sludge, and the annular ejector thus generates a return flow of the washing liquid at a flow rate of 3.6 l / s, which will drastically reduce the sampling rate of the core when drilling fractured rocks.

3. Making an experimental sample of the core sampling device will not be costly, since the most difficult to use assemblies (the fixer assembly and the ejector suspension assembly with the core receiver) can be taken entirely from operating shells with detachable core receivers.

Implementation of the work

1. An experimental stand has been created with the help of which research has been carried out on the parameters of a ring type ejector with slotted nozzles, as well as the distribution of pressures in the formation of the core simulator and its motion in the core receiver.

2. By decision of the Joint Geological and Technical Council of the specialists of the group of companies, BT Corporation, Zhasulan and Co. LLP, KazNITU and CJSC Mining Industrial Group EZTAB decided to assist in the production of a prototype of the core sampling shell and for field testing of the device.

Approbation of work.

The materials of the thesis were reported and discussed at:

- International scientific and practical conference "Mining sciences in the industrial and innovative development of the country" dedicated to the 70th anniversary of the Institute. D.A. Kunaev, 2015 Almaty;
- International scientific and practical conference. Dedicated to the 50th anniversary of the department "Technology and technology of drilling wells" Exploration and oil and gas business in the XXI century: Technology, Science, Education. - Almaty, KazNRTU. November 2016;
- In the expanded meeting of the department "Technology and equipment of drilling wells." The KazNRTU them. K.I. Satpayev.

Scope and structure of work.

The dissertation work consists of 4 sections, it is stated on 112 pages of typewritten text, 77 list of used titles sources.

Conclusion

In accordance with the above-mentioned requirements, a general design of a drilling tool for tapping a core of fractured rocks containing a node for fixing and lifting a core receiver to the surface without lifting the entire projectile and an annular ring type assembly with six slotted nozzles has been developed. The specified missile received a patent of the Republic of Kazakhstan.

Laborotornye studies of the main components of the patented drilling tool for core sampling. The test was carried out on a specially created stand, which shows

the principle of operation of the projectile. The minimal design cross-sectional dimensions of the drilling tool are substantiated, which have the following value: outer diameter - 139.7 mm; the diameter of the drilled core is 52 mm, the length is 5-6 m. The annular ejector is equipped with six slotted nozzles, each of which is equivalent to a round nozzle with a diameter of 10 mm. The recommended type of burglary is PDC 139,7 / 52.

Technological parameters of the projectile consumption of drilling mud (clay) - 7.5 * 10-3 m^3 / s, the flow rate of the return flow of the solution, excluding self-jamming - 3.7 * 10-3 m^3 / s.

All tasks, the solution of which contributes to the achievement of the research goal, are fulfilled. The obtained results make it possible to produce a drilling tool for core sampling from fractured rocks and conduct its field testing.