Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 8.771	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 07 **Volume:** 111

Published: 30.07.2022 **http://T-Science.org**

Issue Article

Annaguly Rejepovich Deryaev
Scientific Research Institute of Natural Gas of the State Concern „Turkmengas"
Candidate of Technical Sciences, Senior Researcher,
Ashgabat, Turkmenistan
annagulyderyayew@gmail.com

OPENING OF PRODUCTIVE HORIZONS WITH INHIBITED DRILLING FLUID «ALKAR-3M» FOR DUAL COMPLETION

Abstract*: the article is devoted to the opening of productive horizons in the process of drilling a well with an inhibited drilling fluid "ALKAR-3M" for dual completion (DC) in difficult geological conditions. The article analyzes the state of oil and gas reservoirs opening at exploration and production areas, systematic studies of the effect of the inhibited drilling fluid "ALKAR-3M" on the reservoir properties of productive formations, as well as the preservation of the natural permeability of the productive formation. This work can be used when drilling exploration and production wells in fields with difficult mining and geological conditions and abnormally high reservoir pressure, in order to open productive layers while preserving natural reservoir properties.*

Key words*: inhibited solution, oil and gas recovery, proplast, oil and gas content, bottom-hole zone, alumocalcium solution, anions, defoamer.*

Language*: English*

Citation: Deryaev, A. R. (2022). Opening of productive horizons with inhibited drilling fluid «ALKAR-3M» for dual completion. *ISJ Theoretical & Applied Science, 07 (111),* 238-240.

Soi: http://s-o-i.org/1.1/TAS-07-111-32 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2022.07.111.32

Scopus ASCC*: 2209.*

Introduction

The choice and application of a rational method of opening productive formations is one of the most important and complex problems of modern technology and technology of drilling and production of oil and gas. High-quality opening of productive horizons leads to an increase in the efficiency of exploration and well productivity, improves the flow of oil and gas from low-permeable layers, which ultimately contributes to an increase in oil and gas recovery of reservoirs.

Analysis of the state of oil and gas reservoirs opening at exploration and production areas, systematic studies of the influence of various washing fluids on the permeability of a porous medium, as well as studies conducted in this area in different countries of the world, allow us to draw a definite conclusion that most productive reservoirs are opened without taking into account the geological and physical features of the reservoir and the physical and chemical properties of the reservoir.chemical characteristics of the liquids saturating it.

The effectiveness of geological exploration for oil and gas is largely determined by the possibilities of establishing the true oil and gas potential and reservoir properties of productive objects in the process of exploration drilling during the opening and testing of oil and gas-bearing formations [1].

One of the main conditions for improving the efficiency of geological exploration is the use of such methods of opening and testing that would ensure the preservation of the natural state of the reservoir and, consequently, sufficient reliability of the results of testing for industrial oil and gas.

It is quite obvious that only such data that reflect the actual natural state of the reservoir can be the basis for assessing the total and recoverable oil and gas reserves. However, in some cases, insufficient consideration of the geological and physical properties of the reservoir and the physico-chemical characteristics of the liquids saturating it during the opening process can lead to completely incorrect conclusions regarding the true industrial oil and gas

potential of the object and even to the fact that some productive horizons of the section may be missed.

In oilfield practice, there are many facts when wells that showed good signs of oil content during drilling and showed themselves quite violently, after putting them into operation, either did not show signs of oil at all, or worked with low productivity. Such a situation significantly reduces the technical and economic indicators of the development of individual deposits or makes their drilling irrational and significantly hinders the timely identification of oil and gas potential in some promising areas.

The poor quality of the opening of the productive reservoir leads to a decrease in the production capabilities of wells, a decrease in the flow of liquid from the poorly permeable layers of the formation, and, consequently, leads to a decrease in the oil recovery coefficient. At the same time, there is a need to create increased depressions during the development and operation of wells, which has a particularly negative effect on the operation of deposits whose reservoirs are composed of uncemented or poorly cemented sands, as well as in the presence of plantar waters. An increase in depression with unstable reservoirs leads to a violation of the bottom-hole zone, which causes a violation of the production column and premature failure of the well; in the presence of plantar water, premature flooding of the well occurs.

One of the most important conditions for preserving the natural permeability of a productive reservoir during its opening is the maximum possible reduction of repression on the productive reservoir. When opening a productive reservoir, the greatest amount of hydrodynamic pressure at the bottom of the well is achieved when the drill bit is working. At this moment, the pressure at the bottom of the well consists of the pressure of the drilling fluid column, the pressure loss in the annular space behind the drill string and the hydrodynamic pressure caused by the vibration of the column during the operation of the bit. Reducing the pressure of the drilling fluid column is achieved by reducing its density and implementing the so-called "equilibrium" drilling method (or even depression).

Special attention should also be paid to the issue of regulating the speed of descent operations and compliance with technological discipline when opening a productive reservoir. This is due to the fact that the speeds of descent operations used in drilling practice can provide very high repression on the formation, up to the production of hydraulic fracturing.

However, no matter how perfect the technique and technology of minimizing repression on a productive reservoir when it is opened by drilling, it is hardly possible to completely exclude repression. Therefore, it is necessary to have a drilling fluid that would prevent the possibility of deep penetration of its filtrate into the reservoir at the time of repression. In addition, a high degree of its purification from the drilled rock must be ensured in order to maintain a minimum density of drilling fluid and the absence of physico-chemical interaction with rocks of the productive zone and reservoir fluids [2].

When opening productive horizons (formations), the same technology and the same drilling fluid are usually used as when drilling the rest of the borehole. Very often, productive horizons (formations) are opened with the use of water-based drilling fluids. In the case of the use of such drilling fluids, the water is filtered into the reservoir.

At the wells of the Northern Goturdepe field №147 from a depth of 600 m to 3800 m.., №37 (800 m – 4900 m), №156 (400 m - 4100 m) and №200 (600 m- 4900 m) were opened on the inhibited drilling fluid “ALKAR-3M”.

All productive layers of wells №37 and 200 Northern Goturdepe were opened on drilling fluid of the ALKAR-3M type. To increase the stability of the well walls and prevent complications, the formulation of the inhibited system of alumocalcium solution “ALKAR-3M” was developed and introduced into production at the Institute of “Nebitgazylmytaslama”. The system is stabilized with lignosulfonates. As an inhibitor containing simultaneously anions (chromate-aluminates, ferrates) and cations (calcium, potassium, magnesium), alkaline and acid hydrolysates of Portland cement are accepted. As a hydrophobic surface active substance (hereinafter surfactant), classes of polyoxyalkylenes in selective solvents are proposed, which perform the functions of a defoamer and a lubricating additive. The industrial surfactant product provides an inhibitor of paraffin deposits in HT-48 oil.

The ALKAR-3M system, due to its inhibitory properties, suppresses the lyophilicity of clays;

1. Allows you to pass colloidal clays without an accident (taking dangerous packs of black clays of the Absheron tier),

2. Leads to significant savings in chemical reagents by reducing the number of treatments, since the solution retains optimal viscosity and structural and mechanical properties for a long time during drilling.

The difference between the inhibiting solutions of the system and the ALKAR system is that they have an increased clay capacity, but ALKAR-3M still has the fastening properties of the filtration crust, due to which an increase in the stability of the borehole zone of the well is achieved. Therefore, the solutions transferred to the inhibited ALKAR-3M system can withstand large values of water yield by 1.5-2.0 times in comparison with the required values laid down in the geological and technical order and at the same time are able to maintain the stability of the borehole for a long time [3].

One of the properties of ALKAR-3M is a set of structural strength over time. Therefore, after long stops (for the period of geophysical research and others) restoration of the circulation of the solution is carried out intermittently after the drilling tool is lowered into the cased part of the borehole (casing shoe). This causes the sedimentation stability of the solution for a long time and reduces the likelihood of the drill string being seized due to the retention of barite particles and drilled rock.

The productive deposits of the deposits of Southwestern Turkmenistan are characterized by a complex and ambiguous composition of rocks, waters and drilling fluid, and oil. Each of the components, interacting with the filtrate of the drilling fluid, determines the deterioration of reservoir properties and a decrease in the flow rates of hydrocarbon fluids. This deterioration is mainly due to two processes, the swelling of clays and the formation of emulsions. The weakening of these processes is carried out through the use of drilling fluids, the filtrates of which have a combination of inhibitory and surface-active properties. Depending on the specific features, in particular, the degree of reservoir blockage, solutions containing mineral inhibitors and surfactants HT-48, in comparison with other types of clay drilling fluids have better c (minimal filtration of water into the reservoir) properties, both when drilling a well and when opening productive deposits.

References:

1. Deryaev, A.R., Gulatarov, H., Orazklychev, G., & Esedulaev, R. (2015). *Rekomendacii po kompleksnomu osvoeniyu metodom ORE mestorozhdenij Zapadnoj i Vostochnoj chasti Turkmenistana* / Nebit we Gaz institutynyň makalalar ýygyndysynyň 11-nji göýberilişi, (pp. 194-202). A: Türkmen döwlet neşirýat gullugy.
2. Deryaev, A.R., & Orazklychev, G. (2015). Vozmozhnost' uluchsheniya kachestva razobshchenieya plastov pri kreplenii skvazhin. / *Sbornik statej instituta Nefti i gaza*, vypusk 12.- Ashgabat: Turkmenskaya Gosudarstvennaya sluzhba pechati, pp.187-195.
3. Deryaev, A.R., Esedulaev, R., & Hancharov, N. (2017). Vybor burovyh rastvorov dlya ORE i vskrytiya produktivnyh plastov. *Nauka i tekhnika v Turkmenistane*, №5, - Ashgabat: Ylym, pp.114-118.
4. Deryaev, A.R., Gulatarov, H., & Mantrova, S.V. (2014). Rekomendacii po burovym rastvoram dlya odnovremenno-razdel'noj ekspluatacii neskol'kih produktivnyh gorizontov na mestorozhdenii Severnyj Goturdepe, *Sbornik instituta nefti i gaza*, vypusk 8, Ashgabat, Turkmenskaya sluzhba izdaniya.
5. Deryaev, A.R., Zhamiev, M.Ya., Gulatarov, H., & Mantrova, S.V. (2012). *Ogranichennyj patent: „Metod obrabotki glinistyh rastvorov s kompleksnoj ingibirovannoj dobavkoj KAIR"*. № 503 ot 13.02.2012.
6. Deryaev, A.R., Zhamiev, M.Ya., Gulatarov, H., & Mantrova, S.V. (2014). *Ogranichennyj patent: „Metod obrabotki glinistyh rastvorov s kompleksnoj termostabil'noj ingibirovannoj dobavkoj KAIR-T"*. № 604 ot 06.06.2014.
7. Deryaev, A.R., Mamedov, B., & Amanov, M. (2021). *Vnedrenie receptur burovyh rastvorov dlya bureniya naklonno-napravlennyh i vertikal'nyh skvazhin*. Mezhdunarodnaya nauchno-prakticheskaya konferenciya studentov, magistrov, aspirantov, soiskatelej i doktorantov. "Rynok i effektivnost' proizvodstva-18", posvyashchennaya 30-letiyu Nezavisimosti Respubliki Kazahstan. Sbornik trudov. (pp.258-261). Kokshetau.
8. Deryaev, A.R., Amanov, M., & Deryaev, S.A. (2020). Vskrytie i osvoenie mnogoplastovyh produktivnyh gorizontov metodom odnovremenno-razdel'noj ekspluatacii. *Nauchnyj zhurnal Aspirant i soiskatel'*, №5 (119), - M: OOO Izdatel'stvo Sputnik +., pp. 23-30.
9. Deryaev, A.R. (2015). Tekhnologicheskie osobennosti vskrytiya i osvoeniya mnogoproduktivnyh gorizontov dlya odnovremennoj razdel'noj ekspluatacii. / *Sbornik nauchnyh trudov instituta nefti i gaza*, Vypusk 11-Ashgabat: Turkmenskaya Gosudarstvennaya sluzhba pechati, pp. 183-193.
10. Derýaýew, A.R. (2022). Treatment of drilling mud with "PACS-T" additive. "Innovative approaches in the modern science" Proceedings of CXV international scientific - practical conference. *International scientific journal*, №7 (115) - M, pp. 74-77.