ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 5 , May 2019

Forecasting of the Emergence of the Absorption of Washing Solutions in the Condition of Drilling Wells in Interface Depth

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ABSTRACT: An explanation of the reason for the absorption of flushing solutions under conditions of drilling wells in intermontane valleys is given. On the basis of the analysis of field material, maps of the prediction of solution absorption along the Fergana intermountain depression are presented. The dependence of the relative frequency of occurrence of absorption due to hydraulic fracturing of weakly cemented and fractured rocks on the distance between the center of the area and the fracture zone is established.

KEY WORDS: absorption, solution, condition, drilling, wells, installing tampons, drilling fluid, cementing material.

I. INTRODUCTION

The prediction of absorption zones is widely consecrated in the literature. However, many studies in the prediction of absorption zones did not take into account the geological features of the structure of the region. The patterns of the influence of tectonic disturbances in clayey sediments with the absorption zones of the washing solution related to fractured rocks have not been studied to a sufficient degree [1].

In the oil and gas industry of Uzbekistan, the absorption of drilling fluid during drilling often occurs in the Fergana and Surkhandarya intermountain depressions.

In order to investigate the causes of the occurrence of washing solution absorption, and the development of effective warning methods, we collected systematized and analyzed materials for well drilling during the last 35 years, where well construction was accompanied by absorption of the washing solution.

As a result of the analysis of the actual material, it is revealed that the absorption of the solution is mainly due to crackle, porosity and permeability of reservoirs and occur for the following reasons:

1. due to the presence in the section of weakly cemented rocks prone to fracturing, to predict their distribution, it is necessary to use them paleogeographic map of the region;
2. the presence of absorption zones is associated with tectonic faults, for their prediction it is necessary to use a tectonic map of the area of the areas;
3. the presence of absorption zones at a large depth associated with karostnyh phenomena, which are poorly predicted. The degree of manifestation of the absorptive capacity of these drilling intervals will largely depend on the optimization of the drilling technology, the minimum repression during drilling and tripping, the development of optimal parameters of the drilling fluid.

Depending on the stratigraphy of sediments, the intensity of acquisitions, methods of preventing and combating them will also be different. For example, the geological and lithological conditions of the Fergana Basin are very diverse. Here, to eliminate the absorption of the solution in the Sokhko-Bactrian tiers, the method of controlling the parameters of the washing solution and their quality are widely used.

II. METHOD

Using this method, about 50% of the total number of acquisitions were eliminated. In the case when the specified method is ineffective, complicated intervals passed without exit (3-5%) of the circulating agent. The method of filling absorbing channels with fillers (sawdust) and installing tampons, pouring FSN and others eliminated about 35% of acquisitions. In other cases, due to the low efficiency of the above methods, the absorption zones are blocked by the descent of the column.

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The absorption of drilling mud in pale pink and brick-red suite of the Neogene is much inferior in intensity and frequency of absorption in the Quaternary sediments. The rocks of these suites have low reservoir properties due to the abundance of cementing material in them. Therefore, in the process of drilling wells there is a slight absorption of the drilling fluid. To prevent and eliminate it, it is enough to add inert fillers to the solution in order to completely block the absorbing channels.

The absorption of the solution in Paleogene and Cretaceous sediments is observed, on the contrary, in heavily drained and exhausted by previous exploitation productive strata with low reservoir pressures. The degree of manifestation of the absorption capacity of these reservoirs will largely depend on the optimization of the drilling technology, the minimum repression during drilling and tripping, the development of optimal parameters of the washing solution, etc. As the experience of drilling wells in Paleogene and Cretaceous sediments shows, with high quality of the solution, good cleaning of it from drilling, and observance of the technological rules, the section is opened without complications.

So, for example, when drilling wells in the areas of West Palvantash (well №№ 111, 150, 151), Izbaskent (well №№ 143, 144), Shorsu (well №№ 3, 5), Northern Alamyshik (well № 12), Suzak (SLE. Nos. 7, 8, 10), while observing all the technological rules and improving the quality of the washing fluid in the indicated sediments, the solution was not absorbed, although complete escapes of the solution were observed in neighboring wells. In this case, partial absorption of the solution was most often eliminated by decreasing the density of the solution and switching to a less forced drilling mode.

At full absorption at shallow depths, complicated intervals were drilled without circulating, followed by casing, or at any depth, drilling fluids with fillers were used to partially or completely block the absorbing channels.

It should be noted that in the southern, southwestern and southeastern regions of the Fergana depression, represented mainly by terrigenous sediments, the main number of acquisitions occur in fractured rocks. Absorption due to hydraulic fracturing of weakly consolidated rocks and associated with karst phenomena, in frequency and intensity occupy a subordinate position.

The most effective way to reduce the damage caused by the absorption of the drilling fluid is to predict them, which allows in many cases to avoid them, as well as to prepare for their manifestation in a timely manner. In this regard, a significant number of works are devoted to the issues of predicting the absorption of drilling fluids when drilling wells in various geological and technical conditions [2, 3, 4]. In [2], it was shown that the frequency of acquisitions depends on tectonic disturbances in the drilled areas. In the development of this situation, we analyzed the field data on the absorption of drilling mud in the Fergana intermontane depression. The results obtained are summarized in Fig. 1 in the form of a forecasting absorption map.

III. RESULT

Consideration of the map leads to the conclusion that the most frequent absorption occurred in the peripheral and near-side zones of the Fergana depression. This is due to three factors:

1. The presence of powerful tectonic faults bordering the depression in the near-side zone. This led to localization in areas adjacent to the fault line, fractured sediments, prone to the absorption of drilling fluids.
2. In the direction from the periphery to the center of the Fergana depression, there is an increase in the average depth of sedimentary strata, which helps to reduce the frequency and intensity of absorption due to the closure of cracks and pores with increasing depth of the reservoir.
3. In the direction from the periphery to the center of the Fergana depression, the degree of homogeneity of sedimentary deposits increases, their sorting increases, the content of fine fractions in them, which act as a filler and cementing element, increases.

All these factors act in the same direction if the exploration areas are located south of the northern zone of tectonic faults and north of the southern zone. In this regard, in the direction from the onboard zone to the center of the Fergana depression, the frequency of cases of absorption of drilling mud due to hydraulic fractures of weakly cemented rocks decreases. This makes it possible to confidently predict a reduction in the risk of absorption of drilling mud as the explored area approaches the center of the intermontane depression (in this case, Fergana), which is confirmed by the graph in fig. 2, built according to Table 1.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 5 , May 2019

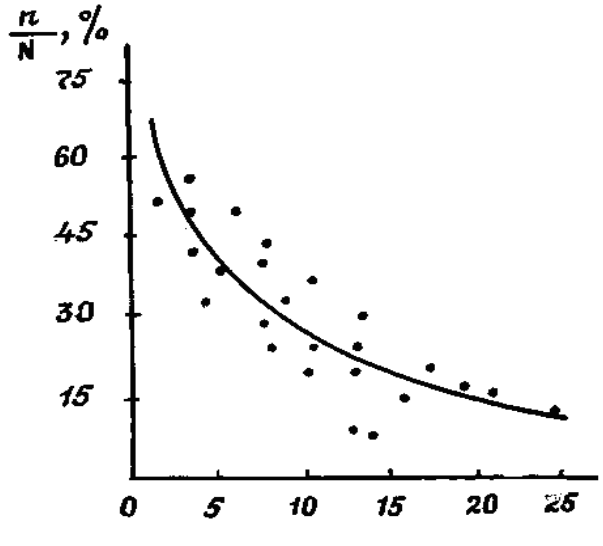

Fig. 2. The dependence of the relative frequency of occurrence of absorption, caused by fracturing weakly cemented rocks, from the distance between the center of the area and the fault zone

Table 1

The relative frequency of absorption of drilling fluids due to hydraulic fracturing of rocks

№	Acreage	Number of drilled well (N), pcs	Amount of Sokhsko-Bactrian tiers (n), pcs	Distance from the arch l 10^3 m	$\frac{n}{N}100\%$, %
1	Varyk	15	8	1,3	53
2	Zap. Burdalyk	3	2	1,8	66,6
3	Bazarkurgan	6	3	3,3	50
4	KazylAlma	7	4	3,4	57
5	Madaniyat	12	4	4,5	33
6	Tergachi	5	2	5,2	40
7	Mingbulak	14	7	5,9	50
8	Shaydock	8	2	6,5	25
9	Ruhar	4	1	7,8	33
10	Digmai	12	5	7,8	41
11	Beshkent	7	2	7,8	28,8
12	Mailisu-1U	47	16	9,1	34
13	Kichkesay	5	1	10,4	20
14	Mailisay	29	11	10,4	37
15	Kubyshevskaya	4	1	10,4	25
16	Alan	4	1	13	26
17	Gaistan	5	1	13	20
18	Supetau	3	1	13,7	33
19	East Isbaskent	28	4	15,6	14,3
20	Yangi-Kurgan	5	1	17,5	20
21	Izbaskent	73	12	20,8	16,4
22	Shorbulak	14	2	22,7	14
23	Namangan	25	3	24,7	12

More difficult is the problem of the role of tectonic disturbances as a factor affecting absorption caused by the absorption of washing fluid into fractured pores. In this case, this type of absorption includes liquid withdrawals in sediment "coke" and "bacterium". There is reason to assume that as the distance from the fault lines increases, the

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 5 , May 2019

probability of their occurrence will decrease, since at the same time, other things being equal, there will be a decrease in the degree of fracturing of rocks, due to tectonic movements of the blocks of the earth's crust.
Of course, it is necessary to take into account the complexity of the phenomena, in particular, to keep in mind the factors noted in [2]. However, it is expedient to search for patterns of the influence of fault lines on the localization of the absorption zones of drilling fluids in fractured rocks.
In this regard, we have constructed a graph of the relative frequency of absorption versus the average distance between the center of the oil and gas bearing area and the line of tectonic disturbances. At the same time, we proceed from the premise that the relative frequency of drilling fluid absorption cases, i.e. the ratio (where N is the number of wells drilled in a given area, n is the number of wells in which absorption was observed in this area), is more objective characteristic of the capacity of wells for absorption than just n, since it is clear that, other things being equal, n depends on N.
In fig. Figure 3 shows a plot of the relative number of absorption in sediments "cox" and "bacterium" versus the distance between the center of a given area and the fault line, which was measured using the map shown in Fig. 1.

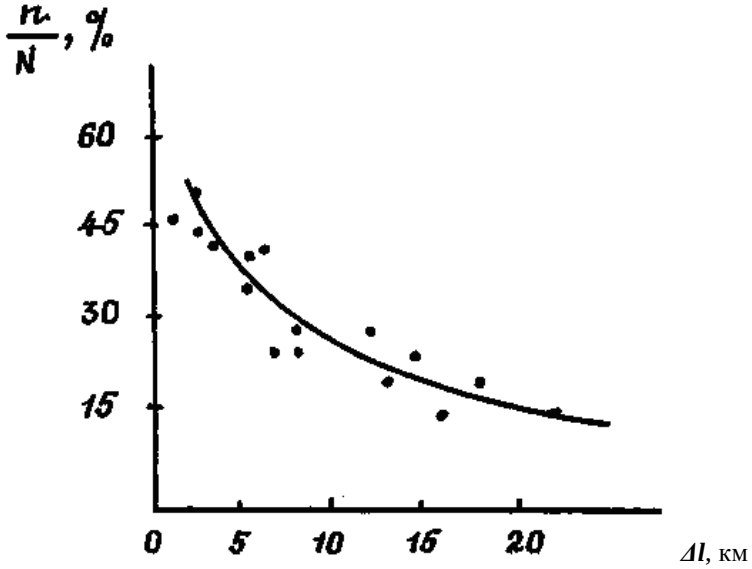

Fig. 3. Dependence of the relative frequency of absorption in fractured rocks on the distance between the center of the area and fault zone *n is the number in which the absorption in this area was noted during the drilling process is a more objective characteristic of the area's absorption capacity than just n, since clear things being equal n depends on N*
The graph in fig. 3 indicates that there is a correlation between the quantities in question.

IV. CONCLUSION

A certain variation in the dependencies between the quantities considered is caused by not taking into account a number of factors affecting the frequency of absorption, such as the thickness of the reservoir, the depth, the drilling mode, etc. There is reason to believe that the established dependencies relate not only to the Fergana Depression, but are more general in nature and are inherent in other intermountain depressions.

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