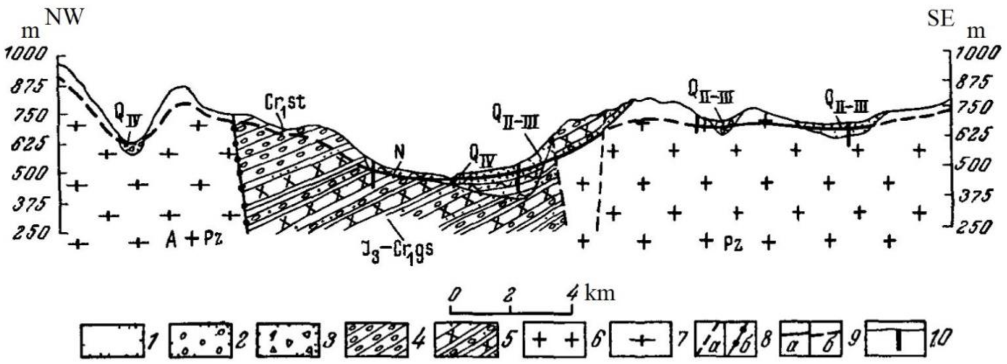

Fig. 2 Hydrogeological section of the Ivolgino- Udinsky artesian basin 1- fine and medium-grained sand; 2- pebbles, gravel, sand; 3- sand, sandy loam, loam with wood and gravel; 4- blocky conglomerates; 5- sandstones, siltstones, mudstones, conglomerates; 6- fine and medium-grained granites; 7-granites; 8-fault, the hydrogeological significance of which is not clear non-aquiferous fault ;9-level undergroundwater with free surface: a)reliable b)supposed; 10- well

Water-bearing rocks in the valley of the Selenga river

Groundwater in the valley of the Selenga River can be subdivided into: stratal waters of Quaternary sediments, stratal-fractured waters of Jurassic-Cretaceous sediments, fractured waters associated with metamorphic and igneous rocks. The flow rates of stratal waters of Quaternary sediments and stratal-fractured waters of Jurassic-Cretaceous sediments ranges from 0.033 to 3.4 l/s; fissure waters of Upper Paleozoic granites - no more than 2 l/s, fractured waters of ancient granites – from 2 to 10 l/min [3].

Therefore, analysis of the Selenga river valley natural conditions showed that the main reason for the flooding of the territory are:

- the structural-tectonic and geomorphological conditions which predetermined the lowered position of the territory and its flat relief;

- the geological structure: well-permeable Mesozoic rocks are surrounded by low-permeability intrusions (Fig.2)

- climatic features (spring-summer precipitation - up to 85% per annum).

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ANALYSIS OF WELL INTERVENTION TECHNIQUES OF PALEOZOIC OBJECTS OF DEPOSITS OF THE TOMSK REGION

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Currently, oil and gas companies face annual depletion of the resource base of the Upper Jurassic and Lower Cretaceous deposits. In this regard, one of the most urgent tasks is the extraction of oil from Paleozoic deposits. Interest in the formation of deposits in them has not waned since the beginning of the active development of the main Jurassic-Cretaceous oil and gas floor within the largest West Siberian oil and gas basin. There are a large number of undeveloped small deposits with a low degree of study, which in the future may become a promising opportunity to increase oil production [1]. However, most of the Paleozoic deposits can be attributed to hard-to-recover reserves, the successful recovery of which depends on solving some issues [2]:

- creating a working three-dimensional model of objects;

- selection of rational well placement;

- determination of the optimal operation mode of wells, taking into account the features of the fields;

- justification of completion methods and types of wells;

- the feasibility of planning various well intervention techniques (WIT).

In this article, the analysis of WIT on Paleozoic deposits of the Tomsk region is considered. Two objects of exploitation are considered: the layer M of the weathering crust and the layer M_1 of the core Paleozoic rocks [3]. A comparison of the layers is presented in Table 1.

Table 1

Comparison of the weathering crust layers with core paleozoic rocks

Weathering crust (layer M)	**Core Paleozoic rocks (layerM_1)**
Siliceous deposits (Si)	Carbonate deposits (Ca)
Pore collector	Fractured collector
Low permeability	High crack permeability
Block structure	High collector power

The separation of the core Paleozoic rocks from the weathering crust is carried out by abnormally high resistance values. Despite the different geological structures and differences in the filtration-volumetric parameters (FVP) of the deposits, the measures were considered together for the object M and the object M_1. In order to select the optimal WIT and technological solutions for further application in the Paleozoic deposits, an analysis of the completed technological solutions used in the fields was carried out. In the course of the work, WIT are accepted as successful, which gave an increase in the flow rate, and the work period was more than 6 months from the date of implementation of the event. To assess the economic effect, an analytical model was created, in which the following conditions are set:

- oil production was carried out continuously;
- the values of the flow rates were completed taking into account the coefficient of the fall of the base flow rate;
- stopping flow rate Q= 0,5 t / day;
- economic efficiency was evaluated according to the standards of the current period.

In total, 53WIT were considered, all the analyzed wells are inclined-directional (IDW). The results of the evaluation are shown in Table 2.

Table 2

Results of the WIT analysis for the fields of the Tomsk region

WIT Type	**Number of WIT**		**Cost-effective WIT**	
	M	**M_1**	**M**	**M_1**
Commissioning of new wells	7	11	1	4
Cutting of side trunks	1	4	0	3
Repair work	3	6	0	3
Additional perforation	2	4	1	4
Hydraulic fracturing	4	1	4	1
Withdrawal from inactivity	2	3	0	3
Translations and attachments	3	2	3	2
Total	**22**	**31**	**9**	**20**

After evaluating the results of the calculations, it was determined that not all successful WIT are cost-effective for the following reasons: low initial flow rate, high costs for the event. The highest production rates were obtained as a result of the introduction of new wells, cutting of side shafts, and various repairs. For all types of WIT, the M_1 formation is the most productive compared to the M formation. The M formation is characterized by low initial flow rates without intensification, the most effective WIT is hydraulic fracturing (HF). According to the results of the economic analysis, drilling of IDW without hydraulic fracturing is not effective for most fields. The main reasons for failed wells include low reservoir FVP values, falling into a water-saturated zone, or a near-fault zone of local FVP deterioration. Figure 1 shows the distribution of the initial flow rates during the drilling of the IDW.

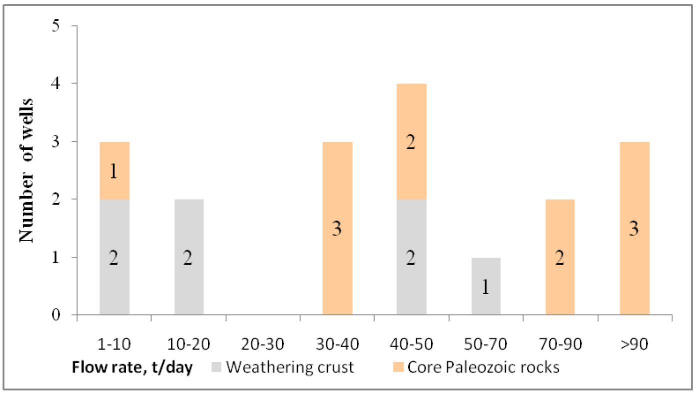

Fig. 1 Distribution of the initial accounts receivable of the IDW

When designing the development, it is necessary to consider additional types of WIT: drilling of horizontal wells (HW), horizontal wells with multi-stage hydraulic fracturing (HW with MGF). The design of the HW with MGF allows for a multiple increase in the area of drainage of reserves and, accordingly, productivity in comparison with the IDW. 3D modeling was performed on an adapted model in the specified real conditions of one of the fields. The forecast indicators of well operation were obtained and the economic efficiency in the analytical model was evaluated based on them. Figure 2 shows the distribution of the initial flow rates of HW and HW with MGF.

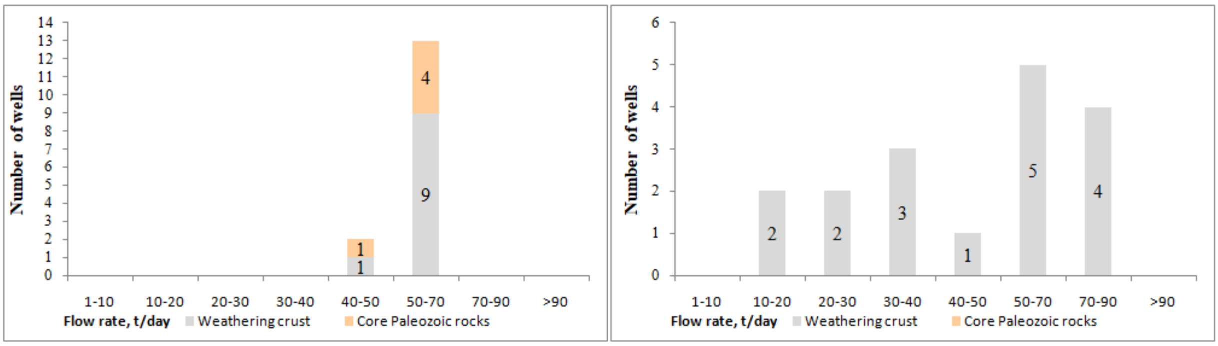

Fig.2 Distribution of the initial flow rates of HW (A) and HW with MGF (B)

Analysis of the calculations showed that all the forecast wells are cost-effective. When using horizontal wells, it is possible to achieve an increase in flow rate by 23% compared to directional wells. The method of drilling horizontal wells with multi-stage hydraulic fracturing allows you to increase the flow rate by almost 2 times relative to the flow rate of directional wells in the productive reservoir M. This technology is the most preferred when developing deposits related to the weathering crust. Thus, the drilling of HW and HW with MGF may become one of the most popular ways to complete the productive horizons of Paleozoic sediments soon.

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CORROSION PREVENTION AND CONTROL OF DOWNHOLE PUMPING EQUIPMENT

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Modern development processes of the oil and gas field are characterized by an increasing complication of geological and technological conditions for the operation of fields and harsh environment of produced fluid. The fluid production leads to premature failures of downhole pumping equipment and oilfield pipeline leaks. One of the main reasons for the failure of oilfield equipment is the corrosion of downhole pumping equipment. Hereafter a statistics graph on oilfield equipment failure due to corrosion is presented [3].

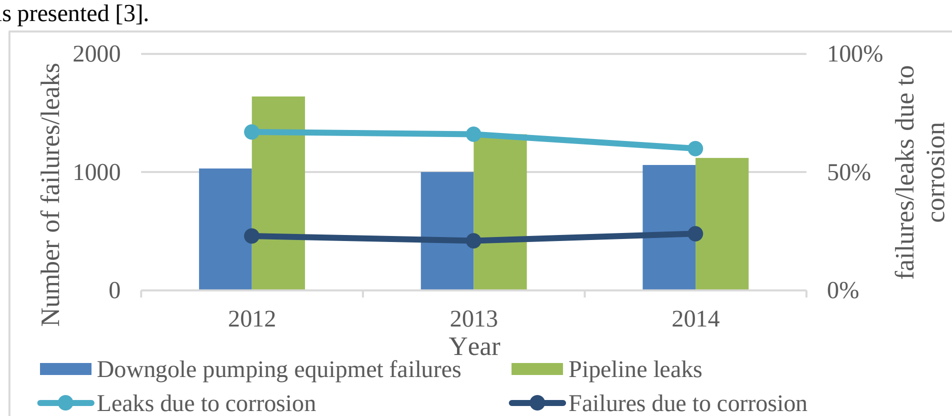

Fig. 1 Downstream pumping failures and pipeline leaks at OAO «Udmurtneft»