INTRODUCTION:
Oil and natural gas are some of the main mineral resources. The oil production developed particularly rapidly after oil started to be extracted from ground through the drilling wells. Growing industrial consumption of oil and gas and possibility of its rapid and cost-effective extraction from the soil depths make these minerals the prior object of searches.

From the point of view of environment protection the oil producing, oil refining and gas industries are the major environmental pollutants and are the sources of negative chemical and physical impact to all natural components.

The expansion of the mineral resource base and fuel & energy resources is integrally linked to increase of drilling operations made for search and detailed exploration of the most important types of minerals.

As the further increase of quantity of exploratory and production wells and the volume of open-pit mining is inextricably linked to ecological balance disturbance, the environment and subsoil protection become an important national economic issue.

Exploration and operational drilling for oil and gas. General information
Exploration stage:
Exploration of hydrocarbon fields (HF) is a complex of works that allow to evaluate the industrial significance of the field found at the search stage and to prepare it for development. Exploration includes drilling of exploratory wells, conducting of studies necessary to calculate the reserves of the discovered deposit and designing of its development method.

During the geological exploration, the following parameters are defined:
- Geological structure of the deposit;
- Spatial location, mode of occurrence, shape, size and structure of deposits;
- Minerals quantity and quality;
- Technological properties of deposits and factors that determine the operating conditions of the deposit.

When designing a system of locating exploration wells, the specialists determine the number of wells, its location, drilling order and grid density. The equidistant grid of wells is used most commonly.

Key performance indicators of the exploration phase:
- Cost of 1 ton of oil and increase of oil reserves per 1 meter of drilled exploratory wells;
- Ratio of productive wells quantity to the total quantity of wells.

Wells drilling:
Among the geological studies and works the wells drilling, testing, sampling of cores and its analysis, sampling of oil, gas and water and its study is very important.

Drilling is the process of rocks destruction with the help of special equipment – drilling equipment.

Aims and Objectives:
- Definition (updating) of tectonics, stratigraphy, lithology, evaluation of horizon productivity without additional wells;
- Definition of productive sites, as well as contouring of oil and gas layer ready under development;
- Extraction of oil and gas from the earth's interior;
- Pumping of water, gas or steam into reservoirs to maintain reservoir pressure or treatment of the bottomhole zone (aimed to extension of fountain method period in oil production or increasing of the oil extraction efficiency);
- Oil and gas production with simultaneous refinement of the productive structure;
- Determination of the initial oil & water saturation and residual oil saturation of the reservoir (and other studies);
- Observation of the explored object development, nature of movement of structure fluids and changes in the gas & oil structure saturation;
- Research of the geological structure of large regions in order to establish general patterns of rocks occurrence and to identify the availability of oil and gas fields in these rocks.

Drilling wells for oil and gas at the stages of regional operations, searches, exploration and development is the most time and costs consuming process. The large costs of drilling wells for oil and gas are caused by complexity of drilling to big depths, huge quantity of drilling equipment and tools, and the various materials necessary for this process, including clay fluid, cement, chemical agents etc. In addition costs increase due to environmental protection measures.

Main problems of wells drilling:
The main problems faced in modern conditions during drilling wells, searching and exploring of oil and gas are the following.

1. The necessity to drill in many regions to depths greater than 4.0-4.5 km is caused with the search for hydrocarbon fields (HF) in unexplored low parts of the sediments section. In this regard the more complicated but more reliable designs of wells are required in order to ensure works efficiency and safety. Therewith the drilling to depth more than 4.8 km has much higher cost than drilling to less depth.

2. In recent years the conditions for drilling and oil and gas exploration have become more complex. Geological explorations at the present time are increasingly moving to regions and places with tough geographic and geological features. First of all these are hard-to-reach areas, undeveloped and unequipped places including Western Siberia, European north, tundra, taiga, permafrost belt, etc. In addition, drilling and searching for oil and gas are conducted in hard geological conditions, including presence of thick rock salt layers (for example in the Caspian region), the presence of hydrogen sulphide and other aggressive components in the deposits, abnormally high pressure in the layer, etc. These factors create great problems in drilling, searching and exploration of oil and gas.

3. The drilling and searching for HF in waters of the northern and eastern seas around Russia creates huge challenges related both to complicated technology of drilling, searching and exploration of oil and gas, and to protection of environment. Oil and gas drilling in marine areas is caused by need for increase of hydrocarbon reserves, the opportunities for it are there. However it is much more complicated and expensive than drilling, searching and exploration, as well as the development of oil and gas accumulations on dry land.

4. Drilling of wells to greater depth (over 4.5 km) in accident-free mode is
impossible in many regions. This is determined by backwardness of the drilling equipment, its deterioration and lack of efficient technologies for wells drilling to great depths. Therefore there is a problem - in the coming years it is necessary to modernize the drilling equipment and to master the technology of superdeep drilling (i.e. drilling over 4.5 km – down to 5.6 km and deeper).

5. Problems are also faced during horizontal wells drilling and during geophysical studies (GIS) there. As a rule imperfections of the drilling equipment lead to failures in the horizontal wells construction.

Errors in drilling often occur due to lack of accurate information about the current coordinates of the wells in its relation with the geological benchmarks. Such information is especially needed when approaching the productive reservoir.

6. The actual problem is the search for traps and the discovery of oil and gas accumulations of a non-anticlinal type. Numerous examples of foreign facilities prove that lithology and stratigraphy, as well as lithologic-stratigraphic traps, can contain a really huge amount of oil and gas.

In Russia structural traps are involved to a greater extent, in those traps the huge accumulations of oil and gas are found. Almost every oil and gas province contains large number of new regional and local uplifts, which constitute a potential reserve for oil and gas deposits discovery. The oilmen were less interested in non-structural traps, which circumstance explains the absence of major discoveries in these locations, although minor oil and gas reserves were found in many oil and gas provinces.

But there are opportunities for significant increase in oil and gas reserves, especially in the platform areas of Ural-Volga region, Caspian region, Western Siberia, Eastern Siberia and other areas are available. First of all the reserves can be related to slopes of major uplifts (vaults, megathelial banks) and the sides of adjacent depressions and deflections which are widely presented in the above-mentioned regions.

The problem is that the Russian oil and gas industry does not have reliable methods of searching for non-anticlinal traps.

7. In the field of searching and exploration of oil and gas there are problems associated with increasing the economic efficiency of geological exploration for oil and gas, which solution depends on the following:

- Improvement of geophysical research methods by mean of gradual complication of geological and geographical conditions for finding of new objects;
- Improvement of the technique of searching for various types of hydrocarbon accumulations, including deposits of non-anticlinal genesis;
- Increasing the significance of scientific forecasts in order to provide the most reliable justification for future searches feasibility.

In addition to the above-mentioned main problems faced by Russian oil companies in the drilling, searching and exploration of oil and gas accumulations, each region and area has its own challenges. The further increase of the explored oil and gas reserves, as well as the economic development of regions and areas and consequently the well-being of people rely upon the solution of these problems and challenges.

**Drilling mud fluid:**

Drilling mud fluid is a complex multi-component disperse system of suspension, emulsion and aerated liquids used for washing wells during its drilling. To prepare drilling fluids the finely dispersed, plastic clays with a minimum content of sand, capable to form a viscous long-settling water suspension are used.

When circulating in the wells, the drilling mud fluid:

- Creates back pressure against pore pressure;
- Cleans the bottom of the downhole from cuttings;
- Transport out the cuttings from wells;
- Transfers hydraulic energy to the downhole motor and the bit;
- Prevents rockslides, collapses, etc.;
- Provides lubricating and anti-corrosive effect to the drilling tool;
- Cools and lubricates the drilling bit;
- Provides information on the geological cross-section.

The choice of formula for drilling solutions in some particular intervals of deep wells in complicated mining and geological conditions is the greatest difficulty, therefore it is very effective to use universal drilling mud fluids that allow to drill down through various drilling intervals with minimal adjustments. Minimizing the consumption of materials for preparation of drilling fluids in solid phase makes it possible to simplify the problem of its practical utilization.

Drilling solutions with small content of solid phase (polymer-clay, polymer solutions, solutions with a condensed solid phase, etc.) are increasingly used in drilling enterprises of Russia. It allows to reduce the consumption of clay, increase the mechanical speed of drilling, improve the technical and economic performance of drilling operations.

It's worthy to pay attention to application of ecologically safe drilling mud fluids based on peat and sapropel, developed at Tomsk Technology University. To prepare drilling mud fluid from peat they use soda, evaporated sulphate ate liquor, sodium carboxymethyl cellulose and other non-deficient and environmentally friendly substances, and this drilling mud was characterized by stable properties and can be easily cleaned from the slime.

The cost of 1 meter of wells drilling with peat solution used for flushing is approximately 2 times lower in comparison to clay fluid. If we take into account that the additional costs are required to neutralize and dispose of toxic drilling wastes, the economic efficiency of peat solutions is much higher. Peat muds are suitable for drilling wells in clay and carbonate rocks, salt deposits, as well as during opening of productive layer. In many cases peat may be replaced by clays and chalk mud fluids. The effective and cheap reagents and modifiers for clay solutions on the basis of peat have been obtained.

The peculiar feature of peat drilling mud fluids is its good compatibility with clay, carbonate and mineralized solutions, as well as with all polymer additives.

The density of the solution can be regulated by selection of appropriate genetic type of sapropel: organic sapropels and peat bogs allow to obtain drilling muds with a density of 1.01-1.03 g/cm³, siliceous and mixed sapropels 1.04-1.06 g/cm³, carbonate sapropels – 1.07-1.12 g/cm³. If necessary the sapropels solutions can be additionally made heavier with chalk and barite.

Peat is a cheap and widely distributed organogenic raw material and can be used both in natural form and in form of lump product of numerous peat processing enterprises. The use of peat instead of clay in hard-to-reach areas of Siberia and the Far North is especially promising as the cost of clay powders is $ 35-40 per ton, and transportation costs for its delivery to the Tyumen region reach $ 100 per ton.

Formulations of peat based drilling mud fluids for wells drilling in permafrost, clay sediments and for opening of reservoirs have been developed. High technological and rheological properties are noted for polymer-peat solutions with insignificant consumption of high-molecular compounds and surfactants, suitable for drilling wells in high-temperatures and pressures, as well as in terms of polymenal aggression. Peat drilling mud fluids are environmentally friendly, easy to clean from slime, after use this fluid can be used for reclamtion of disturbed land both in the form of solutions and in the form of unused peat residues on the wells.

The backfill lightweight materials for wells fastening on the basis of peat and sapropel have been obtained, which have high corrosion resistance in relation to horizon waters. In addition the cement costs are reduced if these solutions are used.

According to the calculations of the All-Russian Research Institute of Oil, the reduction of materials consumption by only 1% during wells drilling provides increasing the volume of drilling by 200-300 thousand meters without additional costs. Using of peat and sapropels fluids in drilling will allow reduction of costs for clay powders and chemical reagents significantly. But the main cost-reduction effect can be obtained by reduction of adverse impacts to environment and reduction the costs of environment protection measures.

The use of cheap and widespread organogenic raw materials with high adsorption and ion exchange capacity is also possible for treatment and purification of drilling wastewater. It is well known that peat and sapropel are widely used to increase the fertility of low-yielding soils. All these facts prove necessity of large-scale introduction of peat and sapropel for neutralization of drilling waste and reclamation of disturbed lands.

The significant part of the reagents used to control the technical properties of solutions is harmful to human health to certain extent. When introduced into solution and evaporated, the reagents pollute the air, so its concentration in the air of working zone (up to 2 meters above the floor or the level of work platform where the permanent or temporary workers are located) is limited. The maximum per-
Wells structure:
The upper part of the wells is called the mouth, the lowest point is called the bottom hole, the lateral surface – the wall, and the space bounded by the wall is called well shaft. The length of a well is a distance from the mouth to the bottom hole along the axis of the well shaft, and the depth is the projection of the length on the vertical axis. Length and depth are numerically equal only for vertical wells. However they do not coincide in inclined and curved wells.

Offshore drilling:
Gradually the oil and gas reserves on dry land are depleted and the global energy crisis worsens which leads to need for more and more extensive development of the oil and gas resources in a marine bed.

Offshore oil production now accounts to about 1/3 of the world oil production. Already at the moment Norway, Great Britain and the Netherlands completely satisfy their oil needs through marine oil extraction, and the UK covers its demand for gas this way also.

The potential oil and gas resources in the World Ocean waters exceed its reserves on dry land by 3 times almost.

Russia is currently on the start of industrial development of oil and gas reserves on the continental shelf. Russia accounts for 22 % of the shelf area of the World Ocean, 80 % of which are considered promising for hydrocarbon production. About 85 % of the fuel and energy resources are located on the shelf of the Arctic seas, 12 % are located on the shelf of the Far Eastern seas, and the rest is located on the shelves of the Caspian, Black, Azov and Baltic seas.

Main technology facilities and its impact to environment:
- Equipment used for wells drilling
- The wells are drilled with the help of drilling rigs, equipment and tools.
- The drilling rig is a complex of ground equipment necessary for wells drilling operations (figure 1).

The structure of the drilling rig includes:
- Drilling rig;
- Equipment for mechanization of lifting operations (hoists and winches);
- Ground equipment directly used in drilling;
- Power drive;
- System of drilling mud fluid circulation;
- Associated installations.

The tools used in drilling are subdivided into the main tools (bits) and auxiliary tools (drill pipes, drill pipe joints, centralizers).

The drill pipes are designed to transfer the rotation to the bit (in rotary drilling).

The following rows of casing pipes are lowered into the wells (figure 2).

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includes supports that provide buoyancy of the platform and a large weight to maintain the vertical position (when air is discharged, the semi-submersible installation is submerged only partially, it does not reach the seabed and remains afloat). During drilling operations the lower housing is filled with water thus providing the necessary stability.

Drilling ships are self-propelled watercrafts and therefore do not need towing to the operation site. Drilling ships are designed especially for wells drilling at great depths (unlimited distance). The drilling shaft passes through the whole hull of the vessel expanding to the bottom. The extracted and then purified oil is stored in the tanks of the ship hull, and subsequently it is loaded into the shuttle cargo tankers.

Drilling platforms of gravitational type are the most stable, as they have a reliable concrete base resting on the seabed. In this concrete base there are built-in casings to drill wells, pipelines and reservoirs for storage of extracted raw material, and a drilling tower located above the concrete base. The seabed at the site of installation of gravity platforms shall be carefully prepared. Even a small incline of the bottom threatens to transform the drilling rig into the Leaning Tower of Pisa, and the seabed protrusions can split the concrete bottom.

The impact of technogenic objects to the environment:

- The modern technology of wells greuting during the drilling is imperfect and does not provide the reliable separation of the layers outside of the casing. For this reason fluids flow from high pressure reservoirs to low pressure, i.e. most often from the bottom upwards. As a result the quality of the entire hydrosphere deteriorates sharply.
- During geological exploration, exploitation and transportation of oil, land is withdrawn from routine mode, natural waters and the atmosphere are polluted. All components of the environment within the areas of oil production are exposed to intensive man-caused load, while the level of negative impact is determined by the scale and duration of hydrocarbon deposits operation.
- The processes of exploration, drilling, extraction, preparation, transporting and storage of oil and gas require large volumes of water for technology, transportation, household and firefighting needs, but simultaneously the same volumes of highly mineralized sewage water containing chemical agents, surfactants and oil products with waste water are discharged.

Sources of pollution of the territory and water reservoirs in oilfields are present to some extent in any part of technological scheme from wells till reservoirs of oil refineries.

- The main pollutants of the environment in oil production process are:
  - Oil and oil products;
  - Sulfurous and hydrogen sulfide-containing gases;
  - Mineralized horizon and sewage waters of oil fields and drilling wells;
  - Drilling slimes, oil and water treatment agents, chemical reagents used to intensify the oil production, drilling and preparation of oil, gas and water.

The technology of wells construction used in our time causes both technogenic disruptions on ground surface and changes of physical and chemical properties of soil at depth when reservoirs are opened during drilling. During drilling and wells equipping the environment is polluted by numerous chemical agents used to prepare drilling fluids. By the present time not all the chemical agents included in drilling mud fluid have the determined threshold allowable concentration and limiting harmfulness indicators.

The environment is substantially polluted by oil and oil products, which can get to the ground surface not only as components of drilling fluids, but also through use of fuels and lubricants when testing wells or as a result of industrial accident. During the construction of drilling rig the atmosphere is polluted mainly by emissions of exhaust gases from vehicles engines to atmosphere.

The operation of diesel units during one year on one drilling site releases up to 2 tons of hydrocarbons and soot into the atmosphere, more than 30 tons of nitrogen oxides as, for example, hydrogen sulphide, can bleed from the wells and emerge from the solution; the torches in which the unused associated petroleum gas is burnt are also ecologically dangerous; and is disturbed;

- In order to maintain reservoir pressure the surface water and various mixtures are usually pumped into reservoirs, which leads to complete change in the physical and chemical properties; it is also necessary to keep in mind the amount of water pumped into the layer;
- In emergencies with uncontrollable open flowing the fluids can get onto the surface and directly pollute the surrounding environment (soil, land, water, atmosphere, vegetation);
- Even in the process of wells drilling without any technology violation the drilling mud fluids penetrate to absorbing horizons, as well as the filtrate of solutions get into the space around the well;
- Highly-toxic gases as, for example, hydrogen sulphide, can bleed from the wells and emerge from the solution; the torches in which the unused associated petroleum gas is burnt are also ecologically dangerous;
- It is necessary to withdraw the relevant lands from agricultural, forestry or other use. Oil and gas production facilities (wells, oil collection points, etc.) occupy relatively small areas in comparison, for example, with coal mines, which occupy very large areas (both the quarry and the dumps of the excavated rocks);
- Huge number of vehicles (especially motor and tractor machinery) to prepare drilling and drilling operations. All this equipment (automobile, tractor, river and sea vessels, aircraft, internal combustion engines in the drives of drilling rigs, etc.) in many ways pollute the environment: the atmosphere is polluted by exhaust fumes; water and soil are polluted by oil products (diesel fuel and oils), and are also impacted mechanically (the soils are compressed).

Measures to reduce the negative impact:

Preparatory stage for construction of geological exploration wells:

At the first stage of preparatory work for construction of geological exploration wells, it is necessary to make rational selection of land sites for the construction of drilling sites. The land sites shall be granted for temporary use for the wells and emerge from the solution; the torches in which the unused associated petroleum gas is burnt are also ecologically dangerous; and is disturbed;

- Capability to induce deep transformations of natural objects of the earth's crust at great depths – down to 10-12 thousand meters. In the course of oil and gas extraction the large-scale and very significant impacts are exerted on the horizon (oil, gas, water-bearing, etc.). Thus the intensive extraction of oil in large scale from highly porous oil reservoirs leads to significant reduction of reservoir pressure, i.e. pressure of the horizon fluid (oil, gas, water).
- The environment is substantially polluted by oil and oil products, which can get to the ground surface not only as components of drilling fluids, but also through use of fuels and lubricants when testing wells or as a result of industrial accident. During the construction of drilling rig the atmosphere is polluted mainly by emissions of exhaust gases from vehicles engines to atmosphere.

The particular attention must be paid to protective measures for the case of possible complications and accidents during wells drilling, protection of land from contamination, neutralizing of pollutants and complete restoration of the land to its original condition to provide for further use.

The size of the allocated land sites during drilling operations depends on the purpose and depth of the wells, type of used equipment and the rig-associated structures. For example to construct the structural exploration wells with drilling rigs
equipped by diesel drive on a flat surface it is necessary to have an area of 2500 m², and in highlands it must be 3600 m². When using the drilling rig BU-50At the area on the flatland and in mountains is 11,000 m² and 16,000 m², respectively. The most important measure to protect the environment is correct the distance between the wells, the withdrawal of the necessary land from ordinary use can reach 7400 m² in addition. The pit of 240 m³ for oil and drilling wastewaters discharge require 3,500 m² in flatland, if its volume 500 m³ it requires 4500 m². The metal containers for collection of petroleum products with a volume of 200 m³ require area of 3350 m².

Before delivery to the construction drilling site of materials and equipment, it is necessary to remove the fertile surface layer of the soil. To collect liquid drilling wastewaters and sludge the slime pits are constructed. Its volume depends on the depth and diameter of the wells. To provide drilling with clean water in amount of 400 m³ per day and more it is necessary to drill additional wells for water, this water is pumped to the slime pit as the sewage water.

Oil inflows, spent wastes and slime can be also poured to the slime pit. Brines with mineralization no more than 250 g/l are poured into a pit. Thus, the pits accumulate liquid and solid drilling wastes of complex composition with aggressive components, which present a great danger to environment.

When drilling deep wells for oil the environment is exposed to the highest negative impacts, the environment suffers from widespread contamination of subsurface caused by poor-quality layers insolation. Significant harm to the environment is also caused by poor-quality materials and toxic chemical substances. In addition due to imperfections, long periods of transportation and storage, the materials such as cement and chemical reagents lose their original properties, which leads to over-consumption of materials and excessive expenditures.

One of the most important means to improve the quality of flushing and grouting of the wells, reducing environmental loads for the environment, is the use of optimal number of high-quality materials, which costs are respectively 25 and 30 % from the total construction costs of exploration wells and for maintenance of the wells. It is very important to keep reasonable normalized consumption of material at the stages of designing, planning and operational management of the wells construction process. In this regard the All-Russian Research Institute of Oil and Gas has developed algorithms and programs to optimize the consumption of materials for flushing and technology for determining the amount of spent drilling fluids for wells.

Accounting for binder substances losses and losses of reagents for wells cementing allows achieving significant savings and improving the efficiency and quality of layers separation.

Utilization of used drilling mud fluids:
Drilling wastes (DW) are drilling wastewaters (DWW), spent drilling fluids (SDF) and drilling slime (DS).

Drilling wastewaters – the water generated by flushing the drilling site, drilling equipment and tools; it contains residual drilling mud, chemicals, oil.

Drilling slime is a mixture of water and particles, destroyed from the face and walls of wells, drilling equipment, casing, abrasion material. It usually rises to the surface when cleaning wells by special devices. That part of the drill cuttings carried out from the wells by flushing liquid is called drill mud.

The spent drilling fluid is the solution obtained after the completion of the wells construction or part of it. SDFs are formed as a result of working out of solution when drilling the intervals composed of clay rocks, changing one type of solution to another, and also during the elimination of accidents and complications.

Let's consider the disposal of drilling wastes. SDFs, that meet certain requirements, can be reused to drill other wells.

The drilling wastes are collected in two pits on the drilling site. Pits are lined with polyethylene film (refer to figure 4). The heavy fraction of waste settles on the bottom of the pit (mechanical separation to liquid and solid phases). The clarified part (if the chemical analysis meets the requirements of safe disposal) is dumped on the drilling site, or used for other technological purposes or disposed of. The sediment after pumping out of the clarified phase is treated with thickening substance (dolomite) and grouting compounds (cement mortar) and after that shall be buried.

Measures to protect land from technology-caused impact:
To prevent and eliminate the consequences of the negative impact of technology caused to imperfections in the well construction, the certain measures are applied. These measures are subdivided in relation to exploration and oil production in the oil fields.

The important way to protect the land is multiple wells drilling (cluster grouping of wells).

At the same time the specific capital investments are reduced for each well, the norm of land allocation is reduced and the length of utility pipelines is also reduced. At the same time the circulation of reservoir waters is limited when they are collected into the system of reservoir-pressure maintenance, which positively affects the state of the environment.

Depending on the intensity and duration of soils contamination by oil products the technical, chemical and biological remediation of soil is conducted.

The technical remediation of soil includes cleaning of the territory, shaping of the distorted areas and machinery of the soil (loosening, disk ploughing) for artificial aeration of its upper horizons and accelerated weathering of the contaminant. To restore the productivity of oil fields it is recommended to have it deep ploughed and left for sun heating (solar thermal melioration). Under the influence of solar thermal treatment the processes of petroleum products degradation are intensified, the water-air condition is improved and the biochemical activity of soils is enhanced.

In order to create optimal conditions for life of bacterial microorganisms able to assimilate hydrocarbons, the acidic soils undergo liming. To restore the quality of sod-podzolic soils, which in result of oil pollution were transformed to man-made salines, gypsum is applied together with artificial moistening.

CONCLUSION:
So, oil and gas wells drilling, carried out in stages of regional works, searches, exploration and development is the most time-consuming and costly process. In addition wells drilling entails a wide range of serious environmental problems, both in terms of mechanical impact on environment (the wells construction technology used today cause technogenic disturbances on soil surface) and in terms of chemical pollution (oil and petroleum products pollute the environment), it can come to the surface not only as components of drilling fluids, but also with the use of fuels and lubricants when testing wells or as a result of an accident; flushing liquids include a variety of chemical ingredients with toxic properties.

Thus environmental problems in drilling are very important today and should be solved reasonably. For example, one of the most important factors for improving the quality of flushing and grouting of wells, as well as reducing the negative load on environment, is applying of optimal quantity of high-quality materials (for exploration and maintenance wells it makes up about 30% of construction costs). Again the problem of excessive expenditures is faced - the drilling equipment, its operation and storage are expensive, but it is not feasible to save money on account of high-quality devices for wells grouting, drilling fluids, etc., as the inaccurate approach in production process can lead to accidents and enormous damage to the environment.

REFERENCES: