

UNIT 2

1. Learn to pronounce the following words properly:

exploration	comparatively
exploitation	perform
various	breakdown
to search	to process
purpose	

Read the following international words and give their Russian equivalents:

process	operation
application	fundamental

Determine the function of the words with the ending “ed”.

e.g. The exploration of mineral deposits started many years ago.

Исследование минеральных залежей началось...

The methods used are...

Используемые (использующиеся) методы...

The methods used in the field are...

Методы, используемые (использующиеся) на этом месторождении...

1. We improved the method of drilling.
2. The engineer asked answered that the exploration of the area had already started.
3. The paper translated by us at the last lesson deals with different problems of interest to those working in the field of chemistry.
4. The results obtained will be of great importance for the work carried on by us.
5. Due to the new method used at present we have greatly minimized the cost of production.
6. Gas is often used as a raw material.
7. The development of oil industry was greatly influenced by the increased demand for oil.
8. The problem discussed at the meeting is of great interest.
9. His experiment in this field has attracted the attention of scientists.

IV. Translate the following sentences into Russian. Pay attention to the Accusative + Infinitive Construction.

e.g. 1) We know this paper to be discussed at the conference.

Мы знаем, что эту статью будут обсуждать на конференции.

1. They want this equipment to be used in drilling wells.
2. The engineers expected some wells to be drilled in this area.
3. We know today's oil wells to be drilled to the depth of 7,000 meters and even deeper.
 1. We assume the experiment to have been completed some days ago.
5. She scientists from Siberia believe the data obtained to be reliable.
6. Geologists have found some chemical substances to be the chief elements the earth crust is made up of.
7. They consider gas production to increase.in the next five years.

V. Read the text and give the main idea of it.

Drilling of wells.

Drilling of holes in the earth's crust is the most effective means of prospecting for and exploration of mineral deposits of all types. This process implies a whole complex of operations which are known to be carried out by means of special equipment (drilling rigs and tools).

Holes may be drilled from the earth surface, from underground mine openings, from the surface of water bodies (rivers, lakes, seas and oceans) from the surface of the Moon, and, in the future, from the surface of other planets.

Depending on their purpose, drill holes are classified into three main categories: exploratory holes, exploitation holes (producing or development holes) and technical holes.

In accordance with the classification of drill holes by their purpose, there are three types of drillings: a) exploratory drilling, b) exploitation (development) drilling, c) technical drilling.

As regards the rock-breaking principle, holes may be drilled by one of the drilling methods which differ fundamentally in their physical nature. It's known that the methods of drilling wells may be classified into three main groups. These are called rotary drilling method, churn drilling method and turbine drilling method, the churn drilling method, or a cable tool, being the oldest.

A cable tool rig is made up of machinery and gear that raise and drop a "string" of tools, consisting of a "bit" and stem on the end of a cable. The heavy bit pounds its way into the earth, pulverizing soil and rock. At intervals, the string of tools is removed. Then water is flushed into the hole and the resulting "slurry" of drilling cuttings is removed by bailing. As the hole deepens, it is lined with steel casing to prevent it from caving in and to protect underground fresh water source that may be encountered during drilling.

The rotary method is comparatively new. It was first introduced by Leschot, a French civil engineer, in 1863. In this method the hole is drilled by rotating bit which is attached to a length of steel pipe.

Turbine drilling method was invented by the Russian scientist Kapeliushnikov in the twenties of the 20th century. In turbine drilling the bit is known to be rotated by the turbine placed on the bore hole. This process is performed without the rotation of the pipes, breakdowns of the drilling pipes occurring seldom. The power on the bit in this method is much greater than in rotary drilling.

(The Petroleum Handbook)

VI. Read and remember the following words and expressions.

crust – земная кора	a rig – буровая установка
means – средство, средства	water bodies - водоём
exploratory hole (well) - разведочно-эксплуатационная	
wild cat well	скважина
producing (development) well – продуктивная скважина	
technical hole - промышленная скважина	
exploitation – эксплуатация, разработка	
to introduce – вводить, внедрять	slurry – жидкий шлам
breakdown - авария, поломка	stem kelly – штанга, квадрат

VII Give English equivalents of the following words and phrases.

ударно-канатный метод; прикреплять долото к трубам; вращаться с помощью ротора; наращивать трубы, средство, бурить скважину, в зависимости от; эксплуатационные скважины; в соответствии с, методы бурения; внедрять новый метод; стальная труба вращается, процесс бурения выполняют; поломки трубы; вращение бурильных труб; нагрузка на долото.

VIII. Translate the following sentences into Russian.

1. As the bit bores a hole, lengths of pipe are added.
2. Recent developments of percussion drilling includes a bit that removes the cuttings as they are formed.
3. In rotary method the hole is drilled by a rotating bit.
4. The bit is raised and dropped, chipping its way into the formation.
5. The energy of the bit is expended entirely on cutting rock.
6. The turning of the table causes the bit at the bottom of the hole to rotate.
7. The increase of the drilling depth causes lengths of pipe to be added.

8. The number of times the drilling bit is to be replaced depends on the depth of the well and the character of the formation penetrated.
9. The mud flushes out the cuttings created while drilling and brings them to the surface.
10. To get better results and to increase the productivity of drilling, it is necessary to use the modern methods and the latest equipment.

IX. Translate the following word combinations into Russian.

- | | |
|----------------------------|-------------------------|
| 1. to raise and drop | 1. в зависимости от |
| 2. to remove from the well | 2. посредством |
| 3. a length of pipe | 3. колонна труб |
| 4. by means of | 4. удалять из скважины |
| 5. depending on | 5. долото присоединяют |
| 6. in accordance with | 6. опускать и поднимать |
| 7. methods of drilling | 7. классифицировать на |
| 8. to classify into | 8. внедрять метод |
| 9. to introduce a method | 9. методы бурения |
| 10. the bit is attached | 10. нагрузка на долото |
| 11. the power on the bit | 11. в соответствии с |

X. Translate into English

1. При ударно-канатном методе бурения используют тяжелое долото и ударную штангу, прикрепленную к концу кабеля.
2. Существует три основных метода бурения: ударно-канатный, роторный и турбинный.
3. При роторном методе долото прикрепляют к стальным трубам, которые вращаются с помощью ротора.
4. По мере бурения скважины трубы наращивают.
5. Этот метод был внедрен в середине 20-х годов.
6. Чтобы удалить из скважины шлам, необходимо закачивать буровой раствор.
7. Глубина скважины обычно бывает очень большой, причем некоторые скважины достигают глубины нескольких километров.
8. Нефть залегает на больших глубинах, причем глубина бурения растет из года в год.
9. Современные методы бурения дают возможность производить бурение на большие глубины.
10. Первый турбобур был изобретен советским инженером Капелюшниковым.

XI. Translate the following sentences into Russian. Pay attention to the Absolute Participle Construction.

e.g. 1. The well being drilled, the oil began to flow. — После того как (так как, когда) скважину пробурили, нефть начала фонтанировать.

2. The production of oil and gas greatly increased, a lot of wells having been drilled in Western Siberia. — Добыча нефти и газа значительно возросла, причем (и) много скважин было пробурено в Западной Сибири.

1. There are two methods of drilling a well, the cable tool method being the older of the two.
2. The soft formations near the surface may be drilled with great speed, the mud fluid playing an important part in the drilling rate.
3. In locating test wells the oil engineer would be influenced by structural conditions, anticlines being the most favourable to justify the drilling of such wells.
4. No well being drilled without the use of bits, drilling processes are extremely important in the oil producing industry.
5. Soft rocks being easily drilled, less weight on bit is necessary.
6. Reservoir fluid saturation is determined in three stages, the first stage being the determination of water saturation.
7. The economic value of oil fields is known to be determined by physical properties of reservoir rocks, these properties being oil, gas and water saturation, permeability and porosity.
8. The drilling of the well was finished in time, with no blowout preventors being used.

XII. Translate the following sentences into English.

1. Мы хотим, чтобы эти проблемы обсудили на конференции.
2. Они знают, что эти методы используются при бурении скважин.
3. Ряд ученых полагают, что нефть органического происхождения.
4. Мы знаем, что долота классифицируют на три большие группы.
5. Ученые считают, что нефть залегает в этих районах на большой глубине.
6. Мы знаем, что это оборудование нужно использовать наиболее эффективно.
7. Они знают, что эта проблема представляет большой интерес для нефтяников.
8. Мы хотим, чтобы они присутствовали при сооружении вышки.
9. Мы знаем, что стационарные вышки сооружаются по частям.
10. Они знают, что полученные данные необходимы для дальнейшей разведки в этой области.

XIII. Answer the following questions:

1. Which is the most effective means of prospecting for and exploration of all mineral deposits?
2. In what way are the wells drilled?
3. What main categories of drill holes do you know?
4. What types of drilling are known to you?
5. What methods of drilling are described in the text?
6. Where was the rotary method of drilling introduced?
7. Where is the bit attached in the rotary method?
8. What drilling method was invented by the Russian scientists?
9. What is the bit rotated by in the turbine drilling?
10. What are the advantages of the turbine drilling?

XIV. Translate the text in writing. Use a dictionary.

DRILLING IN OIL AND GAS FORMATIONS

The development of oil and gas reservoirs requires drilling of numerous wells. A most important stage in well drilling is the final one which includes the bringing in of the productive interval: the lowering and cementing of the casing, equipment of the bottom hole and its deaming stimulating influx of oil and well completion. The entire subsequent performance of the well depends on proper well completions. In the field practice there were many cases when the commercial production of oil and gas could not be secured because the wells were not properly completed. For this reason well completion should be based on the results of studies and active field experience.

Different drilling-in methods are used depending on reservoir pressure, the oil saturation of the formation, drainage conditions and other factors which satisfy the following requirements:

1. In high pressure formations precautions must be taken to prevent uncontrolled gushing.
2. If the permeability of rocks is low, measures should be taken to improve the filtration properties of the bottom-hole zone.
3. The area of the productive formation drained by a well should be big enough to ensure prolonged waterless operation and to stimulate as much as possible the influx of oil to the bottom-hole zone.

The pressure exerted by the column of drilling fluid on the productive formation during drilling is nearly always higher than the formation pressure»

Therefore a certain amount of drilling mud filtrate and clay-like material is forced into the productive rocks.

The water becomes bound to the walls of the capillary channel in the formation and a considerable amount of it remains in the rock after well completion. The proper choice of drilling fluid is of great importance.

(Drilling Engineering Handbook, 1983).