

OFFSHORE DEEP WATER OIL DRILLING

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The difference between offshore deep water drilling of oil wells and shallow water drilling lies in the indicator of the depth at which the work is carried out. The process of extraction of minerals (oil) occurs with the help of mobile platforms and installed equipment. The concept of deep-sea drilling is defined for works that are carried out at a depth of more than 600 meters.

Offshore deep water drilling is carried out with the help of equipped drilling vessels with the property of dynamic stability. Greater depth is marked by the probability of a slight deviation of the drill from the initial position. With this type of oil production, a deviation of the well radius in the amount of three percent of the sea depth is allowed. Crosswinds or frontal winds up to forty-five knots are allowed.

To carry out such an operation, various types of equipment are used. It is impossible to use stationary and semi-stationary installations for oil production. For depths above several hundred meters, drilling vessels with a dynamic stabilization system are used. Their design resembles a standard drilling rig, and the vessel itself has a hole through which the riser pipe and drill pipes pass. All the above elements and their connections are made of steel, which has physical properties that allow it to bend without the risk of violating the geometric shapes of the installation. The material is also resistant to high and low temperatures.

The process of offshore drilling at great depths is complicated by the presence of complex rock. Casing pipes can be used for this. They are used when working on land.

Vessels have an average carrying capacity of 5,000 tons, and some vessels can hold more than 7,000 tons of cargo, which includes liquid fuel, drill oil, and the equipment described above. In the manufacture of ships, materials are used that easily endure negative air temperatures (up to minus forty degrees Celsius) and water, since the bulk of oil deposits are located in plumes of cold climatic zones. The drilling process takes place due to the drilling rig installed in the center of the vessel. The drilling fluid is mixed in the same way.

During offshore deep water drilling, a special flushing fluid is supplied, which erodes the hard rock under the drill. The pump installed in a horizontal position reproduces the flow of fluid through the drill pipe.

An important physical requirement when drilling at great depths is a powerful rotor that drives the mechanism for drilling deep-water wells. The rotor reproduces a rotational action in parallel with pressure to provide moderate force to move the drill deeper.

This type of solution must meet certain physical and chemical properties. It should not have a negative effect on the material of the drill bit. Flushing technology is used to reduce the level of friction between the drill and the walls of hard rock. During the long process of the mechanism, some parts are heated to high temperatures, so there is a need for their cooling.

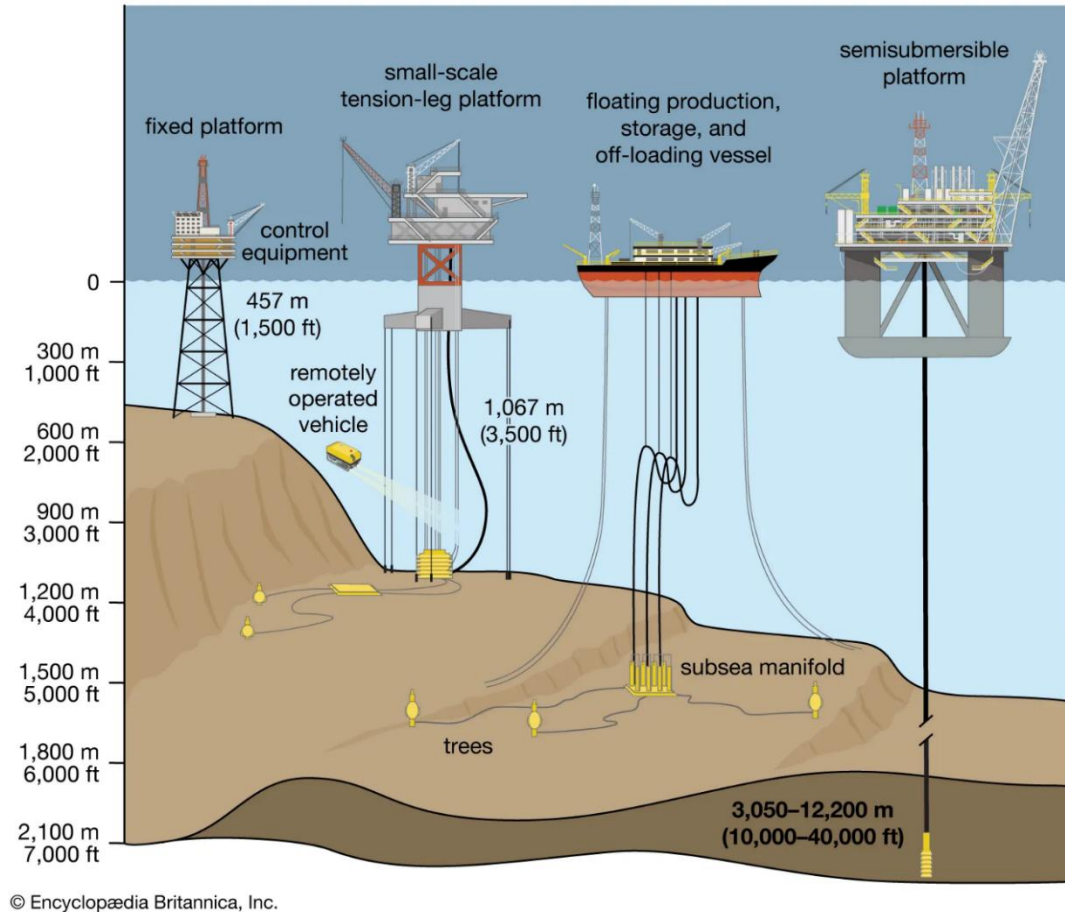


Fig. 1 Offshore drilling platforms

Also, the method of creating oil wells involves neutralizing the risks of particles of oil or gas elements getting under the drill, which can lead to the formation of an explosive situation.

Periodically, a method of introducing chemical components into the applied solution is carried out. This will help give the drill properties such as resistance to high temperatures (no risk of evaporation), resistance to salts, reducing the risk of thickening of some types of fluid used, or increasing the filtration function to clean the well.

The method of cleaning the solution takes place with the help of installed equipment in the form of a vibrating sieve or a special chute. Part of the solution, passing through a sieve, is mechanically cleaned of large particles and rock elements.

The process of oil production at great depths (more than 600 meters) can be influenced by various factors, including the natural conditions of the sea behavior, weather, human factor and technical characteristics of the equipment used. In general, the following constructive natural conditions are distinguished:

Hydrometeorological conditions include the behavior of the sea surface. Also an important role to consider when conducting deep sea drilling is water temperature, wave height, ice movement, maximum visibility on the horizon or nebula. Deepwater drilling factors

A significant limitation of the oil production process is given by negative air

temperature (if no ice crust is noticed on the surface). During such a situation, rapid local icing of the elements of the drill and other auxiliary equipment can occur. During sedimentation and formation of an ice crust, heavy physical efforts have to be applied to clear all the main propulsion elements of a drilling vessel from ice.

The average statistical indicator of the permissible wave height is a figure of two to three meters above sea level. Such conditions will not cause the vessel to deviate from level and level and will not shift the position of the drill.

Reduced natural visibility can limit drilling time at night, when the light from lighting equipment is insufficient due to fog.

Geomorphological conditions determine the position of the seabed, its level of inclination, the complexity of the bottom topography and similar factors that can reduce the speed of production and the horizontal level position of a drilling ship with a dynamic stabilization system (since anchor stabilization systems are not used on ships whose drilling depth exceeds the depth at 300 meters).

Drilling of offshore wells may be suddenly stopped due to a noticeable deterioration in weather conditions. In such cases, it is necessary to briefly stop the production of oil from the well, using the so-called "preventer", which is installed on the well to stop the flow of oil. Its weight reaches 150 tons, and its width is 18 meters.

The advantage of offshore drilling is the absence of hard rocks that could cause rapid wear of the drilling mechanism. The density of rock when drilling on land is much higher, since the sea has rock, which is partially replaced by water, the density of which is 1.03 grams per cubic centimeter. Also, the seabed is different in that the oil reservoirs here are higher relative to the level of the bottom surface than on land, in relation to its surface.

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