Underwater shipbuilding technologies for perspective offshore oil and gas structures in Arctic

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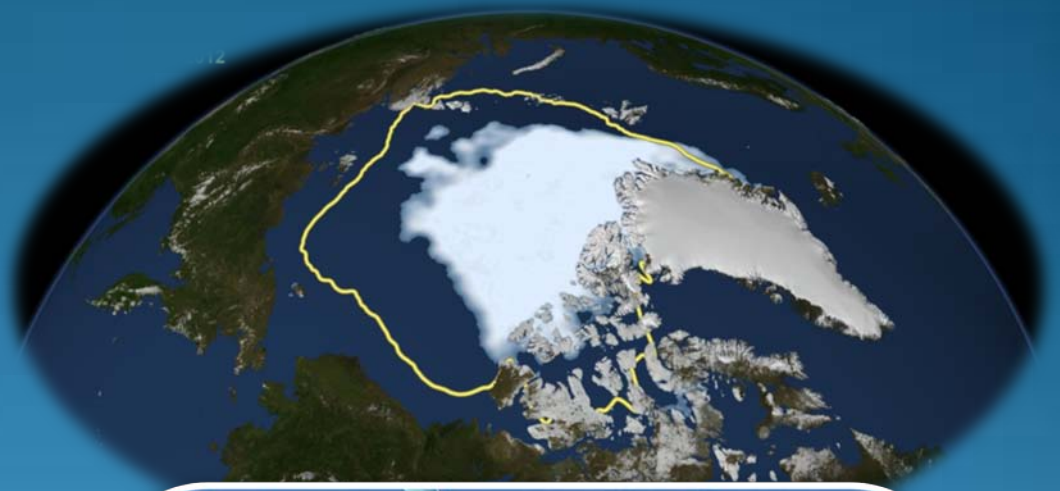
Natural environment and fauna of Arctic basin, as well as Antarctic are associated in people's minds with something primordial, not yet subjected to negative influence of modern industrial technologies associated with production of mineral resources in water areas of the World Ocean.

Repetition in Arctic conditions of the catastrophe similar to one, which occurred in the Gulf of Mexico in April 2010 at the oil producing platform of British Petroleum company, would result in predicted end of fauna and unpredictable consequences for natural environment.



That is why, prior to large-scale production of hydrocarbon resources at deep water sectors of the Arctic shelf, it is required to develop technical proposals and complete a complex of design and scientific research works aimed at the possibly complete exclusion of risks of technogeneous catastrophes during production of mineral resources in Arctic and Antarctic.

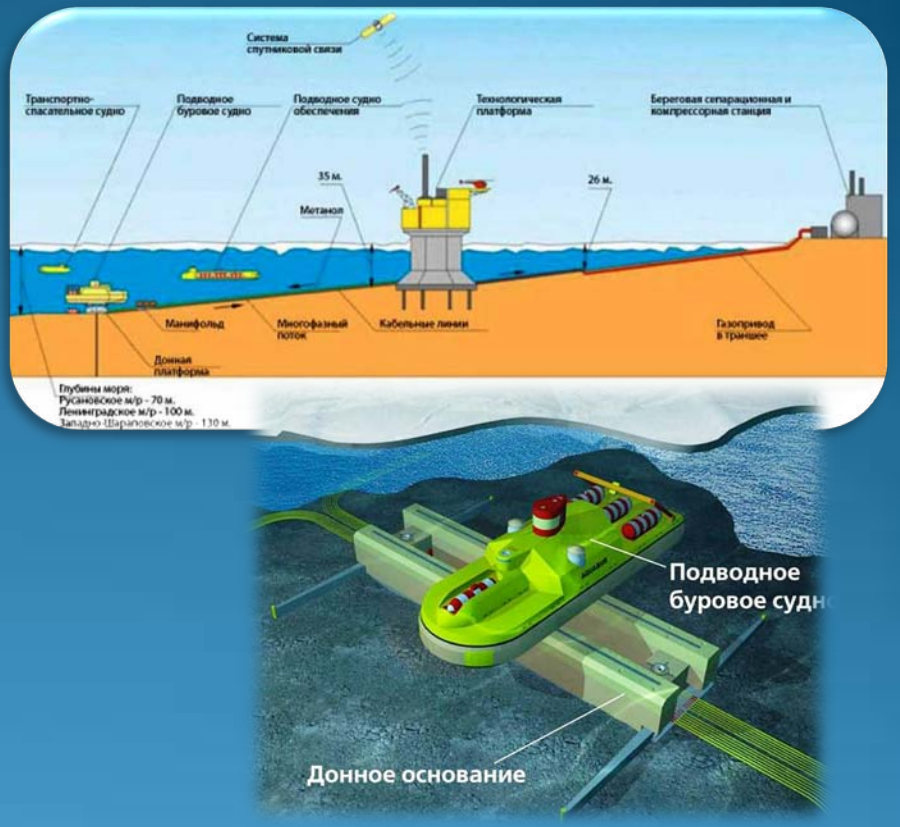
Presently, at the Pechora Sea shelf, 55 km away from the shore “Prirazlomnaya” offshore ice-resistant stationary platform made by “SEVMASH” Severodvinsk enterprise is placed at the depth of 19 m and being prepared to start drilling for oil production. Platforms of such type (caisson structure) can produce hydrocarbon raw materials in shallow waters. Production of hydrocarbons with employment of semi-submersible or self-rising platforms, which is typical for sea water areas not covered with ice, is practically impossible in Arctic due to movement of ice and appearance of icebergs. For Shtokman gas condensate field a variant is under study to employ a production vessel of great displacement, which in case of iceberg appearance shall disconnect from arrangements located close to the sea bottom and depart to a safe place.

Our technical proposal is based on utilization of underwater technologies and includes the following:

- a bundle of strong cylindrical structures (on the water surface or under water) 10-12 m diameter each reinforced with circular stiffeners and strong diaphragms is delivered to the area of the explored field and installed vertically at the sea bottom with the subsequent embedding for several meters;

- at the upper cut of the cylindrical structures (in surface or underwater position) technological, power or other modules of the tight design are installed, which will perform sequential drilling of wells ***strictly inside each cylindrical case,*** moving for this purpose along the special guides from one case to another;

- in the lower part of the cylindrical cases, in addition to a standard set of underwater wellhead equipment (conductors, support plates, support-and-guidance foundations, preventers), a number of high-speed stop devices in special chambers are installed; they are designed for ***prevention of oil, gas or gas condensate blowout into water in emergency cases.***



Design of such ***underwater-under ice or underwater-surface structures*** (if ice conditions allow organizing work at the sea surface) can vary greatly. The following principle is to be invariable: ***drilling of exploratory or production wells at sea depths in the Arctic basin is performed in the inner cavities of strong cylindrical capsules designed for extreme loads, which can occur in emergency cases.***

There are other variants of design solutions for platforms operating at the depths from 50 to 200 m and more. Production and technological capabilities of shipbuilding enterprises of Severodvinsk allow manufacturing of large-size cylindrical and spherical structures made of steel and titanium alloys and capable of sustaining of a hydrostatic pressure corresponding to the depth of immersion in aquatic environment up to 1000 meters and more.

Remotely operated equipment controlled from “Deep Water Horizon” BP platform is known to have been installed at the depth of 1500 meters; it could not be regularly maintained by the platform personnel. It is also known that two Russian deep-diving manned vehicles “Mir” type submerged at the geographical point of the Northern Pole to the depth of more than 3000 meters.

These facts suggest that today it is possible to design ***manned deep-going vehicles,*** which can be at a sea bottom at the depth of 100-1000 meters and more for a long time and perform different technological operations at presence of solid ice at the ocean surface. Scientific research and design institutions of Moscow, Saint-Petersburg and Nizhny Novgorod are known to undertake studies in this direction.

ОАО "ПО "СЕВМАШ"

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СТРОИМ ФЛОТ СИЛЬНОЙ СТРАНЫ

ОТКРЫТОЕ АКЦИОНЕРНОЕ ОБЩЕСТВО СЕВЕРНОЕ ПРОИЗВОДСТВЕННОЕ ОБЪЕДИНЕНИЕ Арктика

Acceptance of such approach to performance of works on production of mineral resources in the water area of the Arctic Ocean and in future, in Antarctic, by all states and work performers should be stated in some binding document (convention or agreement) developed under the auspices of the United Nations Organization.

For scrutiny of the proposal it would be expedient to form a working group of specialists and start examining all the aspects of the project.

We kindly request the seminar participants to inform the parties in interest of our proposal.

Feedback

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Thank you for your attention !

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