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## Abstracts

### Initial data requirements for modeling of the ice exaration impact on buried pipelines

M. A. Naumov,  
D. A. Onishchenko, Candidate of  
Physical and Mathematical Sciences  
OOO «Gazprom VNIIGAZ»

This study regards the problem of determining the optimum depth of the offshore pipeline location in the Northern seas in the conditions of the sea-floor ice exaration. The analysis of the combined initial data required for the correct formulation of the problem and its solutions was carried out and the determining factors were identified. An engineering technique which requires finite element method is proposed to estimate the stress-strain state of the pipeline buried in soil during the exposure of the bottom of the keels to the ice formations of the desired slump.

**Keywords:** *offshore pipeline, ice exaration, keel of the hummock, plough furrows, location depth, engineering method, finite element method.*

### Arctic: Problem of the accumulated environmental damage

Yu. I. Sokolov  
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on Problems of Civil Defense and  
Emergencies» of Emergency Control  
Ministry (Federal Centre for Science  
and High Technology)

Data on the objects of the «past environmental damage» (PED), formed as a result of industrial and military activities in the Arctic zone of the Russian Federation is summarized.

**Keywords:** *ecology, abandoned objects, dumps, waste, impact areas, pollution, rehabilitation, nuclear power stations, radioactive waste, tailing ponds, islands.*

### On the experience of Nordic AHEM on the Arctic seas shelf

L. Yu. Vasiliev, Candidate of  
Geographical Sciences  
FGBU «Northern Interregional  
Territorial Department for  
Hydrometeorology and Environmental  
Monitoring»

The article discusses the requirement, the development conditions and the state of the hydrometeorological service of navigation and the modernization of the North AHEM monitoring network in order to ensure the life safety in the Arctic region.

**Keywords:** *hydrometeorological services, specialized hydrometeorological maintenance, ice maps, above-ground observation network, automatic hydrometeorological station, hydrometeorological safety of navigation.*

### The development of marine power plants that use renewable energy sources

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Sciences  
N. A. Valdman, Candidate of  
Technical Sciences  
M. S. Trub, L.L. Ozerova  
FSUE «Krylovskiy State Scientific  
Center»

The article states the results of the concept development for establishing marine floating power plants that use renewable energy sources. Different structural types and capacities of such plants are discussed. The economic and environmental feasibility of their use in Arctic conditions are shown. Main problems, their solutions, risks, and methods of reducing them are analyzed.

**Keywords:** *renewable energy sources, marine floating power plant, conceptual project.*

### Technical availability of the Russian shelf for development in modern conditions

O. Ya. Sochnev, Doctor of Technical Sciences,  
E. A. Zhukovskaya  
OAO «NK «Rosneft»

Different areas of the shelf seas of Russia (especially the Arctic) significantly differ in their natural environment. For some of them search and mining of hydrocarbons is straightforward, since there is all the necessary technique and technology for it. In other areas the natural conditions are so complex that works on deposit development can be deployed only in distant future after the establishment of fundamentally new techniques and technical equipment. If we take into account that with the exception of the western part of the Barents Sea, the eastern part of the Black Sea and the Sea of Japan, the Russian continental shelf does not have non-freezing water zones, it is evident that for the development of hydrocarbon resources the year-round use of technical equipment in the ice-resistant design is necessary. Their complexity and high cost is one of the main problems of the development.

**Keywords:** *Arctic seas, shelf area, offshore drilling, geophysical study of the shelf, harsh climatic conditions, exploratory drilling, field development.*

### Search, prospecting, exploration and development of hydrocarbon deposits in the Circumarctic region

V. I. Bogoyavlenskiy, Corresponding Member of RAS  
Institute of Oil and Gas Problems of RAS

Geological and geophysical exploration and the results of oil and gas development in five countries of the Circumarctic region are analyzed. The map of the identified gas hydrates is shown and the necessity of comprehensive studies of natural and man-made hazards in the structure of the sea-floor sediments is justified.

**Keywords:** *Circumarctic region, Arctic shelf, oil and gas occurrence, search, prospecting, development of hydrocarbon deposits, drilling, gas hydrates.*

### Establishment of the spent nuclear fuel overload regional center on the FSUE "Atomflot"

M. M. Kashka, A. N. Abramov,  
I.P. Chestnih  
FSUE "Atomflot"

The article addresses issues of the safe use of nuclear energy on the civil nuclear fleet and production activities in both civilian and defense purposes, in the short term and in the long term, at which the achievement of the main objectives of environmental policy is effectively ensured, that is preserving the unique nature of the Arctic region, maintaining its integrity and self-regulation, providing environmental security in the north-western region of the country, as it is always the basis for the "Atomflot" in its activity direction planning.

**Keywords:** *spent nuclear fuel, radioactive waste, coastal overload post, international technical assistance.*

### Militarization increase tendencies in the Arctic region

V. I. Polovinkin, Doctor of Technical Sciences  
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A. B. Fomichev, Candidate of Technical Sciences  
OAO «Koncern «Morinformсистема-Agat»

The development of vast energetic resources as well as projected warming in Arctic have given rise to a particularly dynamic intensification of economic, political and military processes in the region. Transport capabilities and potential resource reserves in the Arctic are such that military presence controlling and protecting the national interests of concerned countries becomes an objective reality. The reasonable transformation of the Arctic region into an important area of global ecology, economics and politics is logically followed by an accelerated militarization. Moreover, the struggle for resources and unique transport capabilities of the polar region make it the central geopolitical arena of the XXI century. Today, right to the Arctic is seen primarily from a position of strength.

**Keywords:** *Arctic, the Arctic region, militarization, NATO, military presence.*

### Some questions on the establishment of marine transport systems for the removal of hydrocarbons from the Arctic

Yu. D. Dekhtyaruk, A. A. Dobrodeev,  
K. E. Sazonov, Doctor of Technical  
Sciences  
FSUE «Krylovskiy State Scientific  
Center»

Principle questions of the marine transport systems establishment for the removal of hydrocarbons from the Far North regions are discussed. Difficulties arising from the use of large ice ships in the marine transportation systems are analyzed. Innovative approaches to the development of new vehicles, allowing to form wide channels in the ice cover for safe and efficient wiring of large vessels, are described.

**Keywords:** *marine transportation system, ice navigation large-tonnage ships, ice navigation tactics, multihulled icebreaker.*

### The marine ice-technology development in Russia: Past and Present

K. E. Sazonov, Doctor of Technical  
Sciences  
FSUE «Krylovskiy State Scientific  
Center»

The main stages of the sea ice-technology development in Russia are discussed. The leading role of the model experiment in the development of knowledge about the interaction of the ice cover with ships and marine engineering structures is shown. At the present stage of development of sea ice-technology the role played by the methods of mathematical modeling is rapidly increasing; together with the physical modeling in ice tanks they help solving complex problems.

**Keywords:** *sea ice-technology, natural experiment, model experiment, ice experiment tanks, mathematical modeling.*

### Features of scientific research and hydrographic work at high latitudes under the ice

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Sciences  
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Features of the use of specialized nuclear oceanographic submarines for scientific research, hydrographic and special operations in high latitudes under the ice are discussed.

**Keywords:** *high latitudes, under-ice research, hydrographic work, oceanographic nuclear submarine, navigation and hydrographic support, satellite navigation systems.*

### Creating of the Arctic Ocean fleet and its part in providing communications in the Arctic during the First World War

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Sciences, A. I. Alekseenko, Candidate  
of Military Sciences, I. N. Kinyakin,  
Candidate of Military Sciences  
Admiral Ushakov Baltic Naval Institute,  
Branch of the Naval Academy of  
the Soviet Union Fleet Admiral N.G.  
Kuznetsov (Kaliningrad)

The article is dedicated to the creation, development and combat activity of the Arctic Ocean fleet to provide ocean-sea communications in the Arctic in the First World War.

**Keywords:** *First World War, Arctic Ocean fleet, marine communications, patrol, escort.*