

## Abstracts

### Fundamental aspects of the rational development of oil and gas resources of the Arctic and Russian shelf: strategy, prospects and challenges

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Authors prove Russia's leading role in arctic oil and gas production on-shore and offshore. The comparison of gas production volumes in Yamal-Nenets Autonomous District and other regions of the World, including the North Sea, Gulf of Mexico and the Persian Gulf are given. The forecast of oil production on the Arctic shelf is done. The basic natural and technological challenges of the oil and gas industry development in the Arctic, including the large-scale subsoil degassing, behind-the-casing flows and technogenic deposits of hydrocarbons are described. The most important aims of rational environmental management and direction of the Russian oil and gas industry development are distinguished.

**Keywords:** *The Arctic oil and gas production, environmental management, natural and technogenic challenges, the strategy of the development.*

### Pre-conditions of oil and gas potential of «expanded» legal shelf of the Russian Federation in the Arctic Ocean

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Pre-conditions of oil and gas potential of the "expanded" shelf area under application of Russia to the UN Commission on the Borders of the Continental Shelf are first considered. The features of geological and geophysical knowledge of the area are analyzed. Geohistorical background of oil and gas potential and change law of "basin" cover thickness are briefly considered. Existence of transregional shelf-slope Chukchi-East Siberian megatrough of polycyclic development, which is the main objective for forecasting and prospecting, is substantiated for the first time in the literature; data of preliminary quantitative assessment of resources by comparison with the standard and on the basis of basin modeling are given. The directions for further research are outlined.

**Keywords:** *Arctic Ocean, borders of continental shelf, oil and gas potential, quantitative assessment of resources, basin modeling.*

### Prospects for the mining industry in Greenland

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In recent years, interest of mining industry in mining mineral resources of Greenland is growing significantly, accompanying by increase in funding of exploration and research works. The article shows that quite vast area of Greenland coastal zone has significant resources of ferrous, non-ferrous, rare, radioactive and noble metals and precious stones. The conclusions are made about promising types of minefields. In the near future, Greenland could become a leading player in the global market of critical metals.

**Keywords:** *Greenland, deposits, minerals, metals, rare earth elements, mining.*

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### About probable diamond content of sediments of the White Sea Neck

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Testing of friable bottom deposits of the White Sea Neck allowed ascertainment of higher content of heavy mineral fractions and diamond satellites in several depressions of bottom relief. Potential basic sources of diamonds are identified in the coastal area of existing and expected kimberlite fields of Kola coast. Five priority areas are planned for more detailed study. It is proposed to improve the method of sampling for the purpose of increasing the depth of sampling up to 0.5 m from raft surface.

**Keywords:** *diamonds, sediments, White Sea Neck.*

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### Features of population settlement in the Arctic zone of Russia

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The theoretical issues of population resettlement in the Arctic zone of the Russian Federation are considered, the changes in settlement system in the 2000s are analyzed, the grouping of settlements according to the number of inhabitants are made; dynamics of urban population of the Arctic are shown, the conditions and prospects of development of urban settlements are described, statistical data of population censuses for the years 1979-2010 and data of the current population count for 2015 are given.

**Keywords:** *Arctic zone of the Russian Federation, population resettlement, population of cities and towns, population size of settlements, natural resource potential.*

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### Evaluation and selection of investment solutions for oil and gas development in the Arctic

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The necessity of development of optimal investment schemes for implementation of the unique oil and gas fields of the Russian Arctic shelf is substantiated. The options of evaluation of such projects in accordance with their social significance are proposed. The necessity of state participation in the implementation of projects is substantiated. The necessity of not only quantitative but also qualitative evaluation of hydrocarbon field projects are proven, and evaluation criteria are proposed..

**Keywords:** *oil, gas, shelf, investment project.*

### **Social responsibility of mining companies in the territory of traditional nature management as a basis for partnership between the government, business and indigenous peoples of the North**

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The issues of implementation of the concept of business social responsibility in the conditions of the Russian Arctic are discussed, namely the activities of mining companies in the areas of compact residence of North indigenous peoples. The necessity of establishment and development of partnership between government, business and local communities for socio-economic development of Arctic settlements are substantiated.

By the example of the group of companies "Almazy Anabara", the issues of social partnership of mining companies and indigenous peoples in the process of industrial development of the Arctic territories are considered.

**Keywords:** *Arctic territory, social responsibility of business, use of mineral resources, indigenous peoples, sustainable development, partnership.*

### **Autonomous bottom station of express control as part of an integrated system for monitoring and control of radiation and chemical contamination of the Arctic seas**

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In connection with the prospect of large-scale development of the Arctic, the relevance of the work in the field of ecological safety of the Arctic seas is increasing, which is due to the intensification of oil and gas development, wide «nuclear legacy» of the USSR and potential accidents of nuclear powered ships, floating nuclear power plants, radioactive waste storage facilities.

It is shown that the developed autonomous bottom station for monitoring of radiation situation and aquatic toxicity will enable timely information and help to develop optimal management decisions in the field of emergency management and risk management in the waters of the Arctic seas.

**Keywords:** *The Arctic, ecology, safety, radiation monitoring, contamination, emergency, bottom station, communication, water environment, PSA, risk.*

### **Late Mesozoic plume magmatism in the Arctic region: geochronology, phases geodynamic conditions of detection**

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According to the results of field research on Spitsbergen and Franz Josef Land and analysis of marine geological and geophysical data and published materials, the spatial and temporal characteristics of the Jurassic-Cretaceous plume magmatism in connection with geodynamics of destructive transformation of the lithosphere of the Arctic in the context of the formation of the Amerasian basin and Canadian Trench are presented. Staging and polycyclic multiphase of plume magmatism is substantiated, and reflected in geochronology of formation of its provinces in the Arctic region.

**Keywords:** *superplume, stages and phases of magmatism, geodynamics, spreading, Canadian basin, the Arctic continental margins, magmatic province.*

**Electrochemical profiling is effective and environmentally friendly method of search and exploration of hydrocarbons in the Arctic seas**

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VNIIOkeangeologia named after  
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An electrochemical method based on a set of ion-selective electrodes for detecting heavy metal anomalies in sea water which are the indicators of oil, gas and gas condensate in sedimentary cover is developed and introduced into practice of hydrocarbon deposit prospecting in the Russian Arctic shelf. During comprehensive works in Priyamal Kara Sea shelf, the electrochemical profiling was carried out in conjunction with seismic, seismoacoustic observations, geological and hydrophysical sampling and subsequent analytical determination. Electrochemical anomalies are revealed that, after interpretation of all data, can be compared with identified promising areas of hydrocarbon deposits.

**Keywords:** *hydrocarbon deposits, electrochemical method, ion-selective electrodes, profiling, the Kara Sea.*

**Experimental methods for determination of total ice loads on marine engineering structures**

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The experimental methods for determination of total ice loads on marine engineering constructions are studied. In particular, the methods allowed measuring the ice loads in natural and modelling conditions are discussed. The natural experiments with the ice-breaker "Kapitan Nikolaev", whose rostrum well simulates a conic engineering construction, are described in detail. Capabilities of modelling experiment for determination of total ice loads on marine constructions with complex geometry of the surfaces interacting with ice are described.

**Keywords:** *global ice load, marine engineering construction, ice development pool, natural experiments, ice modelling tests.*

**The application and evaluation of methods for metal working by explosion when performing the tasks in the areas of the Arctic region difficult of access**

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The proposals on the use of explosive energy for repair of technical equipment failed during engineering works, including the elimination of consequences of emergency situations in remote areas of the Arctic region are developed; the scientific and methodological apparatus to assess the effectiveness of explosion energy for repair of technical equipment are proposed.

**Keywords:** *engineering, technical equipment, explosion energy, the criteria of technical and economic efficiency.*