Materials of Conferences

SAFETY OF THE ARCTIC MARINE TRANSPORT IN RUSSIA AND MEANS OF ITS SUPPORT

Borisova L.F.

Murmansk State Technical University (MSTU), Murmansk, e-mail: lfborisova@mail.ru

The analysis of the safety problems of northern maritime transport has been fulfilled. It has been proposed to ensure safety of navigation in areas with intense traffic nym use MVTS – Mobile Vessel Traffic Services. Combined use of MVTS and VTS traditional will expand the functionality of opportunities VTS and remove the territorial limits of use.

Introduction. Regions close to the sea lanes, a special place in the organization of transport, since 90% of trade in the European Union with the rest of the world runs by shipping. The economic security of Russia is largely determined by the development of ports of the North-West and Euro-Arctic regions. Russia is interested in developing oil and gas resources of the Arctic shelf, the development of the Northern Sea Route and the ports of the Russian part of the Barents region. A central issue in the transportation of oil by sea is the environmental safety of transport.

Safety analysis of the northern maritime transport and means of support. Most of the world's new oil and gas resources are concentrated in the Arctic and the continental shelf. Russia has the longest shelf on the planet, which accounts for 85% of the Arctic sector. To harness the enormous natural wealth, concentrated in the Arctic and the continental shelf, and their transportation requires special care, because here we are faced with the sensitive environment and one of the most vulnerable ecosystems in the world. In the Arctic, oil spills are more likely, and the effects spill harder to eliminate than in other regions. This is due to the lack of natural light, low temperatures, the dynamics of ice cover, strong winds and poor visibility. Natural-climatic conditions of the Arctic seas do not effectively eliminate the effects of oil spills and contamination of other dangerous goods. Ice conditions make it difficult for shipping and slow down the restoration of contaminated ecosystems, low rate of dissolution of oil in cold waters has more negative effects on the environment. The oil spill is the most serious potential source of large-scale contamination during transportation of oil. Prevention of oil spills and the creation of mechanisms that regulate safely move cargo ships in the Arctic, is an important task aimed at ensuring maritime security.

One of the most dangerous types of accidents are collisions. Damage to vessels in the collisions leads to the loss of buoyancy and stability, disruption of other seaworthiness and may lead to loss of vessels, their crews, passengers and cargo. Collisions are often accompanied by fire, flooding a large number of compartments, vessels and other effects that hinder the effective conduct of rescue operations. Collisions indicate problems in the organization of movement, especially in coastal and offshore areas adjacent to the sea ports, which are characterized by increased intensity of shipping. Environmental risk is aggravated by the lack in the territorial waters of Russia special sea lanes for oil tankers – any vessel in the waters can collide with the tanker.

Increase of emergency cases of maritime transport, leading to catastrophic consequences, death, environmental disasters, as well as the increased threat of terrorism raises the problem of security in maritime transport to the rank of national security. Specific issues relating to maritime security are reflected in a number of legislative acts, such as: Naval Doctrine of the Russian Federation, the Merchant Shipping Code of RF, the Code of Inland Water Transport, defining public policy of the Russian Federation in the field of maritime activities. Adopted federal program identified a number of major structural transformations of the marine transport system of Russia. However, there are no effective tools for safety analysis of transportation systems, no clear structure and composition of the indicators, evaluation criteria, no clear methods of modeling. The management of traffic safety should be considered in risk assessments associated with the transport of dangerous goods, systems analysis, ship safety and recommend measures for the prevention, containment and elimination of consequences of accidents. It is necessary to develop models of security and development of the accident, as well as analytical modeling of the formation and spread of the damaging factors in accidents and the development of models for assessing potential consequences of accidents.

The most effective way to ensure safety when sailing near the coast is Vessel Traffic Services (VTS/SUDS-systems – control systems of movement of vessels), which controls ships, location and observance of ships' crews of the rules of navigation, as well as helps in case of emergency situations and the difficulties in determining the location. In RF VTS is part of the state system to ensure safety of navigation is created and operates in the waters of the sea ports and the approaches to them, in internal waters, territorial sea and contiguous zone of Russia. VTS is a complex set of fixed technical installations near shore services. The main disadvantage of modern VTS are limited coastline and coastal zones of the adjacent to the seaport, binding to the shore and shore-based services, inconvenience, complexity of procedures of governance that require expensive specialized equipment and infrastructure supply. Key measures to improve maritime safety in the offshore and coastal regions are aimed

at improving the technical equipment of the VTS that makes the system more costly and cumbersome. As a result the use of modern VTS is effective only in economically developed areas with sufficiently strong transport infrastructure of the port. The main function of operators in the management of the CFS Centre involves a great influence of human factors. Not enough attention is paid to improving information and technology security, which is an alternative to technology modernization. There are a number of specific problems in navigation, which are out of VTS activity and pose a real security problem: small size vessels, sports vessels, and other craft that are not under the control of marine register; outlying offshore and coastal regions of fisheries preventing navigation on the traditional transportation routes; areas of extraction of natural resources in the coastal shelf, where shipping is characterized by high degree of environmental risk and where the deployment of fixed VTS services is economically unreasonable or impossible, medium and small port areas with poorly developed industrial and economic infrastructure cannot maintain the efficiency of the VTS.

Solving such problems is proposed by using special localized geographically Mobile Vessel Traffic Services (MVTS – by analogy with the VTS/MSUDS-system – a mobile control system of movement of vessels) [1]. MVTS are characterized by locality area of service, efficiency, speed of deployment and termination, deep formalized management procedures based on the use of modern information technologies and means of implementation, which reduces the negative impact of human factors in decision making, ease of implementation, flexibility. MVTS do not demand technical resources and energy, are not critical to the area-based, ground or surface, and can ensure safety of navigation in any area with heavy shipping, including remote marine areas, which are act of control of stationary VTS. MVTS may be temporarily or permanently deployed in any location to service floating in the river or lake areas. To realize MVTS can be used standard technical resources of port, including equipment for monitoring and identification of ships and other floating equipment – AIS, radar, ARPA, physical channels and means to implement procedures for information exchange between system components – GMDSS, TV, radios, computational tools (computers) and software. Information for MVTS does not require any significant computational power [2] and can be implemented on the basis of small computers and affordable mobile telecommunications to the provision of mobile subscribers (ships) and the operators of the MVTS Centre and preserving access to the networks of GSM/GPRS, Internet and corporate networks (Intranet). MVTS Center can be placed in coastal areas or in conjunction with the VTS Center, as well as be waterbased, e.g. the flagship. Implementation of interaction services MVTS based on Reference Model Open Systems Interconnection (OSI) of the International Organization for Standardization (ISO) using protocols and standards governing the normalized procedures for safety of navigation, as well as the interaction of system components at communication and transfer of management decisions (recommendations) provides accessibility of MVTS to interact with other systems in accordance with current standards.

Conclusion

Combined use of opportunities for both stationary and mobile VTC and future telecommunications and navigation technologies will expand the functionality of traditional VTS, remove the territorial limits of use, flexibility, mobility, to expand the range of services for the posting of various boats, to reduce the negative impact of human factors in navigation. Due to this, such systems can significantly improve the safety of navigation. VTS and MVTS should be considered as part of a multimodal associative transport system (MATS), seaport, providing efficient and safe navigation in the waters with heavy traffic of vessels. The use of such systems in areas of the Arctic shelf and the northern sea routes can be considered as a promising means of ensuring the safety of navigation in Arctic Russia.

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APPLICATIONS OF LASER-PARAMETRICAL TECHNOLOGIES FOR SEISMIC EXPLORATION OF PETROLEUM FIELDS

[1]Zapivalov N.P., [2]Bednarzhevskiy S.S., [2]Smirnov G.I., [2]Josan D.A.

1Institute of Petroleum Geology and Geophysics Siberian Department Russian Academy of Sciences, Novosibirsk; 2Siberian Department of International Institute for Nonlinear Sciences of Russian Academy of Sciences, Novosibirsk, e-mail: sbed@mail.ru

Among various innovative technologies for exploration and development of oil-and-gas fields, there are some ideas and projects not realized as yet. Nowadays when a technological breakthrough in oil-and-gas exploration and production is urgently needed, laser technology is supposed, in a long-term prospect, to make it possible to extract