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Improving Information Cooperation During Search and Rescue Operations in the Arctic Zone of the Russian Federation

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Abstract. A complex analysis of the security situation in the Arctic zone of the Russian Federation shows the limited independent capabilities of the EMERCOM of Russia in solving the problems of search and rescue at sea area across the entire width of territorial waters. An effective method for organizing search and rescue at sea in the Arctic can be interagency and intergovernmental cooperation based on the Agreement on Cooperation in Aviation and Maritime Search and Rescue in the Arctic and the Polar Code. In order to increase the efficiency of the tasks being solved, it is proposed to strengthen the coordinating role of the control bodies of functional and territorial subsystems in their search and rescue activities in internal waters and the territorial sea. The authors proposed a solution consisting of the integration of information resources of information and coordination centers in Murmansk and Petropavlovsk-Kamchatsky with the information capabilities of the functional subsystems of the EMERCOM of Russia and equipping Arctic complex emergency rescue centers with ice-class ships.

1. Introduction

Recently increased attention to the Arctic region is associated with a high level of geopolitical, economic, environmental and scientific interests of the Russian Federation, other countries participating in the Arctic Council, China, South Korea, Japan [1-7]. The Arctic zone of the Russian Federation as an independent object of state policy includes internal sea waters, the territorial sea, the exclusive economic zone and the continental shelf of Russia. Extreme natural and climatic conditions, remoteness from the main industrial centers of the country, low population density and focal development of territories are characteristics of the Arctic. In addition, a feature of the Arctic region is the increased vulnerability of human life and activities in difficult natural conditions and the existing risks of natural and man-made emergencies.

These and other features require an increase in the level of information interaction, monitoring and timely notification of possible incidents in the region, especially in the sea areas. A limited number of search and rescue (SAR) forces and resources are dispersed throughout the region, owned by various departments. It is required to quickly adapt the actions of the coordination systems in the Arctic marine area in response to every emergency on the Northern Sea Route (NSR) or in other areas of the Arctic and further develop international cooperation [8]. It is planned that in the 21st century the NSR



will become the Euro-Asian maritime transport corridor [9], which means that security issues in this region will continue to be decisive.

2. Methods

The fulfillment of the main tasks in the field of ensuring security in the Arctic zone of the Russian Federation is carried out through the development of the Universal State System of Prevention and Response to Emergency Situations (RSChS). RSChS also carries out liquidation actions of oil spills and oil products, including the waters of the NSR.

By 2040–2050 in the Arctic due to the melting of ice, a noticeable increase in transcontinental shipping [10] and other types of human activities are predicted.

Modern approaches to the development of the Arctic zone put forward new requirements for ensuring the safety of the population and territories from possible emergencies. Risk analysis shows that facilities located in the Arctic can become sources of major man-made nature emergencies. In connection with the exploration and production of oil and gas, the development of hydropower, trawling and drilling of the seabed, road and industrial constructions in extreme natural conditions that contribute to increased wear and tear of technical systems, the risks of emergencies are increasing. Emergency sources can also be: accidents and shipwrecks, oil spills, oil leaks from abandoned tanks and sunken ships, forest-tundra fires; accidents in places of extraction of ore minerals; risks of fires, explosions and accidental emissions of hazardous substances. The increasing risk of emergencies leads to changes in the efficiency, content and scope of rescue operations.

The experience of Norway, the USA and other Arctic countries shows the effectiveness of the use of polar aviation and airborne technologies, rescue ships in the Arctic [11,12,13]. From a scientific point of view, the MARPART research work carried out in Norway deserves attention - a project on organizing transboundary cooperation in emergency situations in the High North deserves attention [14]. The work includes an assessment of the risks associated with marine activities at high latitudes. Researchers emphasize the need to focus on interdepartmental and intercountry partnerships between state emergency response agencies, as well as private companies in the Arctic region.

Currently, the government is rapidly developing the transport system in the Arctic zone of the Russian Federation. This system is being created to transport oil and gas, ensure reliable transport links, develop mineral extraction and develop transit through the Arctic. The main national transport artery is the NSR. A characteristic feature of the route is that it does not have a single fixed route. The NSR route passes not only in the territorial sea of the Russian Federation, but also outside it, which characterizes the specifics of the route and creates the peculiarities of the formation of the Arctic security system.

Search and rescue of people in the Arctic is associated with forecasting and responding to emergencies, the functioning of international, state, departmental, regional and corporate security systems. In this regard, the problem of improving information international and interdepartmental interaction during the functioning of the RSChS is of particular interest in the scientific and practical terms.

The analysis shows that international and state regulation is aimed at protecting the most significant elements of the natural environment and emergency rescue activities in the region. Despite the rivalry and confrontation of the leading world powers in the Arctic, the growth of the potential for conflict in the region, there is a tendency for the development of international legal regulation in the field of security. States-participants of international agreements express their readiness to jointly eliminate emergencies and their consequences in Arctic area[15].

3. Results and discussion

In the Strategy for the Development of Maritime Activities of the Russian Federation until 2030, the restoration of comprehensive monitoring of the state of the natural environment and pollution of the water areas of the seas of Russia, ensuring the ecological safety of the marine environment, improving information support of maritime activities in order to increase their efficiency and safety are the main

priorities for the development of the state's maritime activities. In connection with the prospect of the development of transport corridors and the extraction of minerals, sea tourism, the relevance of the task of finding and rescuing people in the Arctic seas is increasing. The high rate of development of emergency processes of explosion or fire, associated with emissions and combustion of hydrocarbons, distinguish accidents at offshore oil and gas facilities, tankers and gas carriers from other objects of maritime activity. The time and availability of the accident site for life-saving equipment, as well as the readiness to act in difficult conditions are a critical factor for organizing the rescue of people in the sea and ice [16].

The main dangers, challenges and threats that form risks for the development of the Arctic zone of the Russian Federation and ensuring security include:

- low level of development of information, communication and transport infrastructure;
- a high level of professional risk, due to unfavorable climatic conditions, among other things;
- inconsistency between the rate of development of the emergency rescue infrastructure and the rate of growth of economic activity;
- lagging behind the development of the NSR infrastructure, construction of rescue and auxiliary fleets from the timeframes for the implementation of economic projects;
- lack of an emergency evacuation system and medical assistance to ship crew members in the water area of the NSR.

The analysis of the liquidation experience of emergency situations in the Arctic zone of the Russian Federation shows a significantly slower response time, insufficiently accurate forecast and assessment of the scale of negative impact on nature and possible damage. Among the main problems in conducting search and rescue operations in the Arctic conditions should be highlighted:

- impossibility of using conventional methods of leaving and evacuating people from sea vessels;
- lack of information on ice and hydrometeorological conditions of navigation of ships;
- remoteness of Arctic rescue centers and rescue equipment from the locations of possible accident targets;
- limited quantitative and qualitative capabilities of ice-class rescue vessels in the area of objects of maritime economic activity in the event of an emergency;
- limited capabilities of aviation support for search and rescue operations at sea.

To solve the problem of ensuring the safety of people and cargo in the medium term, it is necessary to improve rescue technologies at sea area, develop information cooperation between all participants in search and rescue operations.

The forces and resources of RSChS in the Arctic zone belong to various functional and territorial subsystems of RSChS of federal executive authorities (EMERCOM of Russia, Ministry of Transport of Russia, Russian Federal Border Service, Ministry of Defense of Russia, Federal Service for Hydrometeorology and Environmental Monitoring, Federal Agency for Maritime and River Transport and others), constituent entities of the Russian Federation and local self-government bodies, organizations whose powers include solving issues of protecting the population and territories from emergencies and eliminating their consequences.

The EMERCOM of Russia is actively involved in the implementation of the state policy in the field of rescue. The number of the force grouping for the protection of the Arctic zone is over 16 thousand people. In the Arctic region, the EMERCOM of Russia plans to create 10 Arctic integrated emergency rescue centers (AIERC) to search and rescue people on water bodies, in the forest-tundra, as well as to provide various assistance in emergencies. Currently, there are already three AIERC (Naryan-Mar, Arkhangelsk, Dudinka), four regional search and rescue teams. There are two maritime rescue coordination centers (Murmansk, Dikson), maritime rescue sub-centers (Arkhangelsk, Tiksi, Pevek), as well as bases of rescue equipment and equipment for oil spill response, which are located in Dikson, Tiksi, Pevek and the village of Provideniya [17].

The results of the research carried out by the authors show the insufficient staffing of the operating AIERC with personnel and emergency rescue equipment. The boats and amphibious boats that are part of the forces are usually intended for operation in river and coastal areas at a small distance from the

coast as a crew, passenger, rescue, medical or patrol vessel. They are limited by the area of navigation and the season of operation. The technical features of small vessels do not allow them to be used in the sea territory at a distance of up to 12 miles.

In the conditions of the intensive growth of shipping and cargo transportation in the Arctic zone and on the NSR route, the urgent task is to improve the system of rescuing people in the internal sea waters and the sea territory of the Russian Federation. For this reason, it is necessary to continue equipping AIERC with modern technology and equipment. Currently, it is planned to form an aviation group of 14 aircraft based at the airfields of Murmansk, Vorkuta, Norilsk and Anadyr. Building up the grouping of forces, improving the mechanisms of their interaction continues during search and rescue and emergency rescue operations. The creation of an AIERC in the villages of Dikson, Tiksi and Sabetta is required. Rescue centers will provide a mode of constant readiness and emergency response to any emergencies and fires. The centers should be highly mobile, equipped with aviation equipment, all-terrain vehicles, universal rescue and fire-fighting equipment, as well as floating craft [18]. In addition, AIERC will collect and process interdepartmental information about the situation, prerequisites for the occurrence and elimination of emergencies.

Interdepartmental regional information and coordination centers (ICC) are being created in Murmansk and Petropavlovsk-Kamchatsky to coordinate the cooperation of federal executive bodies performing state functions in internal sea waters, on the continental shelf and in the high seas of the Arctic zone of the Russian Federation. ICCs monitor the situation in maritime spaces, situational analysis and develop decisions on the use of forces and means in order to minimize damage from security threats. The ICC structure consists of integration, information and telecommunication segments (Figure 1).

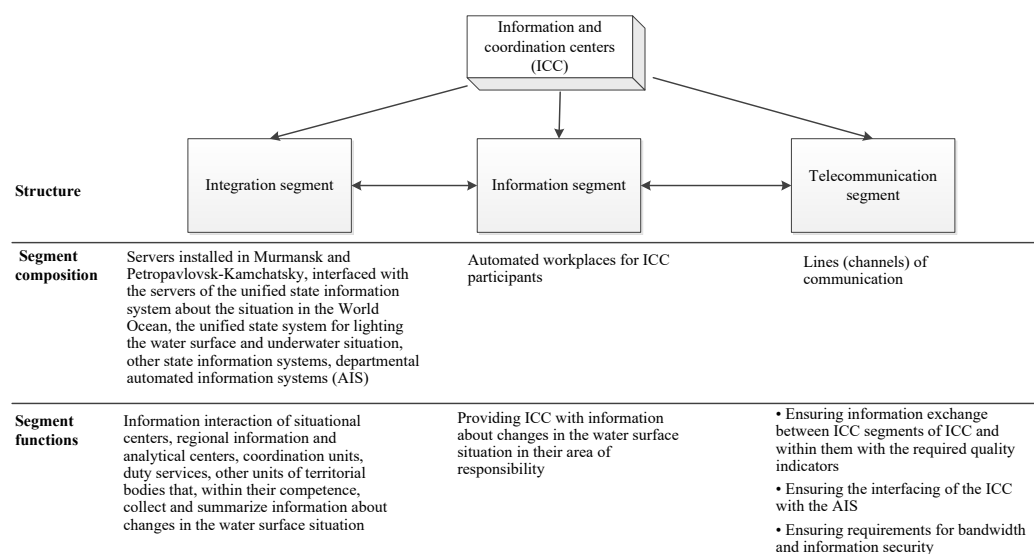


Figure 1. The structure of information and coordination centers.

The main tasks of the ICC are:

- collection, generalization, analysis and storage of information about changes in the water surface situation;
- ensuring continuous access of territorial bodies (military command and control bodies, subordinate organizations, subdivisions) and officials of federal executive bodies and Roscosmos State Corporation to information on changes in the water surface situation.

The participants in the interdepartmental regional ICCs are territorial bodies, officials of the State Federal Space Agency of the Russia, the Ministry of Internal Affairs of Russia, the Ministry of Natural Resources of Russia, the Ministry of Agriculture of the Russian Federation, the Ministry of Transport

of the Russian Federation, the Ministry of Emergency Situations of Russia, Federal Security Service of Russia, Federal Service for Veterinary and Phytosanitary Surveillance, Federal Service for Hydrometeorology and Environmental Monitoring, Federal Supervisory Natural Resources Management Service, Federal Agency for Fishery, the Ministry of Energy of Russia. The agreements of the participants determine the list of data to be transferred, the mode and procedure for interdepartmental information interaction. The coordination of work to ensure the functioning of the ICC is carried out by the border authorities.

The organizational, legal and technical capabilities of the system can be used to create an information system for monitoring the situation in order to solve the problems of search and rescue at sea. The technical implementation of the organization of such information exchange is possible by connecting individual information systems of the EMERCOM of Russia to the IRICC by allocating separate automated work places. The system should be built in accordance with the basic reference model of open systems interaction and have a unified interface for communication with various applied specialized tasks. The information monitoring system should provide free access to subscribers, have organizational, software, technical, mathematical, methodological, linguistic, metrological and legal support.

4. Conclusion

The capabilities of the forces and resources of the EMERCOM of Russia on the NSR and other sea areas of the Arctic zone of the Russian Federation are limited and unevenly distributed throughout the territory. This requires coordination of actions from a single center, especially on the NSR route, which may go beyond the territorial sea of the Russian Federation and the adjacent zone.

In the current national standards and departmental regulations in the field of rescue of sea vessels, it is necessary to fully take into account the severe natural and climatic features of the Arctic zone of the Russian Federation and the requirements of the Polar Code concerning individual and integrated equipment of rescue at sea.

The development of a security system in the Arctic zone of the Russian Federation is required. It is possible to create Arctic complex emergency rescue centers in Pevek, in the villages of Sabetta, Tiksi and Dikson. When creating these centers, it is advisable to consider the quare of equipping them with aircraft, all-terrain vehicles, rescue vessels and tugs, which would allow for search and rescue operations throughout the territorial sea.

It is necessary to expand the possibilities of using information and coordination centers in Murmansk and Petropavlovsk-Kamchatsky for forecasting and liquidation emergencies in Arctic sea waters and rescue at sea, especially in the water area of the Northern Sea Route.

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