

## **PROBLEMS OF NAVIGATION SAFETY PROVISION ON THE NORTHERN SEA ROUTE**

*Vladimir M. Pazovsky*

*Navigation in Arctic Seas was, is and will be fraught with the raised risk of navigation incidents. A ticket to successful shipping in high latitudes is an efficient work of all the elements of the Northern Sea Route, a high professional, especially glacial preparation of ship crews. Some measures are taken to restore the functioning of this important maritime communication in Russia, but a lot is off to do both in the field of technique and in the matter of maritime education.*

**Keywords:** The Northern Sea Route, navigation safety, search-and-rescue operations in high latitudes

In view of the growing intensity of shipping on the Northern Sea Route, navigation safety provision problems, especially the cruising of very large crude carriers, assume priority importance there.

Ice navigation and that one of smaller vessels and on ice-routing services are often accompanied by the vessel damage.

For example, on the 16th of March 2009, while tanker 'Indiga' was following the atomic ice-breaker 'Yamal' as part of a caravan in Yenisei bay, while overcoming the lot of screwing ice, the ice-breaker sharply lost way, it was turned about and the tanker following it received a strong dynamic strike of the screwing edges of the channel by the corpus. A crack of the general length of 9,5 m was formed as a result of the strike, the maximum crack growth was 8 mm. The tanker followed in ballast, environment pollution did not occur. And it departed for the port of Arkhangelsk accompanied by a rescue-vehicle for docking.

That tanker was not also lucky in 2010: on the 15th of July its collision occurred with the other tanker of Murmansk Shipping Company 'Varzuga' while their cruising with the cargo of diesel fuel for the needs of Chukotsky Autonomous District. The tankers ran on the Northern Sea Route to the ports of Pevek and Providenie in the caravan conveyed by atomic ice-breakers 'Taimyr' and 'Russia'. The ice-breakers leading the caravan stuck in the glacial strip under heavy ice conditions. The tankers crews did their best to stop immediately but could not manage to avoid touching the after body of the tanker 'Indiga' by the forebody of the tanker 'Varzuga', and 'Indiga' received the damage of the after body, that did not result, fortunately, in the loss of navigability. The environment pollution did not occur; no one from the crew was injured. The tankers proceeded to the ports of destinations.

As you can see, even such powerful ice-breakers as atomic ships, are not always able to ensure accident free conveying of even comparatively small vessels. Especially in case of strong ice motion and compression.

To tell the truth, one cannot but note that a relative possibility of loss of vessels in ice is one order less than in the open waters of the World ocean, according to risk evaluation while the vessel cruising on Northern Sea Route performed by materials of Central Marine Research and Design Institute, Arctic and Antarctic Research Institute and Russian Maritime Register of Shipping, thankful to clear arrangement of the Shipping, continuous control for movement of each vessel and the timely rendering of help to ice-beakers. A possibility to get heavy water leaking ice damage of the corpus does not exceed 2% from the number of cruising vessels on the Northern Sea Route. The vessel collision in coastal waters of the World Ocean occurs with the same level of probability. The cases of emergency oil spill from the tankers have not been marked judging from 30-years maintenance of 17 tankers of the ice class. Atomic and diesel line ice-breakers have been operated on NSR accident free. Radiation environment on the atomic ice-breakers has been within the framework of technical standards.

It is possible that it is difficult for seamen with the long term experience of cruising in ice not to doubt such an evaluation but the statistics is more convincing.

Nevertheless, navigation safety provision under the ice condition is much more difficult than while working in ice-free seas. It is comforting that last year the government of Russia has paid much attention to the Arctic region on the whole and navigation provision on NSR in particular.

The ways to provide navigation safety can be briefly reduced to the following:

1. It is necessary to provide sufficient ice-breaking navigation. One cannot build up hopes that the global warming being observed will melt the ice and give the vessels a possibility to cruise on their own. Moreover, the scientists' opinions differ concerning duration of this warming.

According to Federal Marine and River Transport Agency's calculations, to provide the forecast large-scale cargo flows in the Arctic Region it is necessary to have 6 atomic ice-breakers, 4 diesel line and 4 ice-breaker-providers to serve the drilling platform. Decisions were made regarding construction of three atomic and three diesel electric line ice-breakers, and even the realization of these decisions was started, one can expect that the Russian ice-breaking fleet will have started renovating by 2015-2016.

The ice-breakers of new generation must be ready for not only conveying vessels but to fulfill a various kinds of emergency recovery operations including the struggle with the sea pollution with oil in case of possible vessel damage while cruising in ice.

10 specialized centers of safety provision are expected to have been created by 2015. They will be located in the most important points along the whole Arctic coast. The centers will be equipped with the land off-highway transport, caters and boats capable to work under severe conditions of the Arctic region. But they will hardly be able to render help in case of accidents with heavy-tonnage vessels following high-latitude routes.

Ice-breaker must perform rescue functions under such conditions. The ice-breakers crews must be completed with experienced divers ready to patch up holes, change the broken in ice propeller blades; experienced gas and electric welders as in the Soviet times. The icebreak-

ers must have the prepared ‘whickers’ to wind up a tugboat in a sufficient number. As in the former times, ice-breakers must be completed with lazarets with modern equipment, experienced surgeries, general practitioners, nurseries (that allowed to save lives of the crew members of ice-breakers and the conveyed vessels not for once).

Helicopters are necessary on ice-breakers despite the expenses. Ice charts received from satellites will always be suitable only for choosing a strategic direction of the caravan movement. An optimal route can be chosen upon availability of a helicopter and experienced hydrologist that will allow to reduce expenses for fuel and conveying time, lower a probability of ice damage of the vessels conveyed. Besides, the helicopter will allow rendering urgent medical help upon necessity.

The ice-breaker must possess equipment in case of liquidation of oil spill though the technology to collect the spilled oil from the sea surface covered with ice has not been developed yet.

2. Reactivation of the hydrographic service of NSR and its Fleet has been started. Navigation maps of northern seas have always been abundant with unauthentic depths and oriented outlines of a number of islands but they have been constantly corrected by surveys of hydrographic vessels in summer and hydrographic teams from ice in winter. The vessels have navigated traditional (not for once checked by the corpus) routes along 10-meters isobath near the coasts of Chukotka and via the Straits of Sannikov or Dmitry Laptev forwarded to the Laptev Sea. New routes have been needed for very large crude carriers.

One is needed to do justice: a good deal has been done in respect to this for the last couple of years. According to Deputy Minister of Transport Viktor Opersky’s words, maintenance checks and renewals of technical watercraft and non floating aids of navigation provision have been carried out according to a plan to modernize the system of navigation and hydrographic provision on NSR. Bottom-charting and creation of data base for electronic navigation maps have been carried out for traditional and high latitude traces. Surveys of 31 thousand kilometers and high latitude traces with depth up to 40 meters and the tract of 10 kilometers have been already made. About 200 new electronic maps of the traces of Northern Sea Route must appear to the end of 2012.

By the way, the Americans discovered that they have not renewed

navigation maps of the seas adjacent to Alaska for 50 years and have urgently organized an expedition there.

Moreover, the USA joined other Arctic coastal states to develop by mutual efforts navigation maps that could raise navigation safety in the Arctic Region. Representatives of Canada, Denmark, Norway, Russia and the United States at the meeting in Ottawa established a new Arctic Regional Hydrographic Commission, that is headed by Canada.

On its part, Ministry of Transport of RF is planning to complete developing a network of control correcting stations of GLONASS/GPS along Northern Sea Route by 2020. Satellite system will allow to determine the location of the vessel in the Arctic Region with accuracy of 10 meters. Also, Mintrans intends to complete construction of stations of Global Maritime Distress and Safety System in the Arctic ports of Igarka, Dudinka, Dixon, Tiksi, Pevek, Providenia, to construct and modernize a series of geographic vessels of ice class, to complete development of new high latitude deepwater routes for navigation of vessels with the draft of more than 15 meters.

3. It is necessary to restore hydro meteorological service of NSR trace. Ice situation changes there depending on winds not by days but by hours. A majority of polar stations has been closed, weather forecasts have been received from foreign sources or resent from Vladivostok. Information concerning ice environment has been received from satellites, at the same time the apparatus to receive it is not on all icebreakers. Decoding the received maps helps to judge only ice compaction but not its structural characteristics. Ice air observation has been liquidated.

Russian government has also taken care of this problem.

In 2010 President of RF entrusted the government to consider the matter of creation of multipurpose space system 'Arktika' and formation of hydro meteorological and climatic monitoring sub-systems. President emphasized that the Arctic Region, as one of the most important ones to study the climate change consequences, is still inaccessible for continuous hydro meteorological observations.

The space system 'Arktika' is supposed to be created as the system to observe the weather changes and assist during minerals exploration in the Arctic Region. R&D Association named after Lavochkin together

with Federal Service of Russia on Hydrometeorology and Monitoring of the Environment are entrusted to create this system. Five satellites are supposed to be launched. Particularly, they are two meteorological optic satellites with the conditional name 'Arktika-M' which will actually allow to watch weather changes continuously in the north and to forecast the genesis of natural source anomalies. The Russian enterprise will also develop radiolocation satellite 'Arktika-R' that will determine the accurate condition of the ice situation and provide the conveyance of vessels on NSR, and two communication satellites 'Arktika-MS' will provide continuousness of telephone, television and radio communication including those ones for sea and air craft in the northern regions of the country.

4. Due to the fact that the Arctic Region becomes the region where accessibility of oil, gas and ore mining deposits grows multiply and the Northern Sea Route will be accessible for international carriers during several months per year in the perspective, coastal states took care of possible damage to fragile environment of the Arctic Region and in 1993 Protection of the Arctic Maritime Environment Program (PAME) was adopted the participants of which members of the Arctic Union, namely, Canada, Denmark, Greenland, Faroe Islands, Finland, Island, Norway, the USA, Canada and Russia became. Besides, the Organization of Indigenous People of the North and representatives of many international organizations joined them.

Pollution with oil represents a peculiar danger for the sea surface covered with ice. Development of oil spill liquidation technology is a task for ecologists, chemists and technologists.

5. Management of the vessel in ice is very specific whether it is navigation as part of the caravan or on its own. Highly qualified experienced navigators are needed for safe navigation not only on ice-breakers but also for the conveyed vessels. It is necessary to know not only maneuvering qualities of the vessel itself but those ones of the going ahead, it is necessary to evaluate the environmental ice situation and to keep safe distance in the caravan depending on it.

Experience has proven that the youth today is deprived of romantics and is not striving to devote his or her life to work on ice-breakers. The future navigators do not know that the work on ice-breakers is more

professional, interesting and thrilling than, for example, routine watch on the transport vessel crossing the ocean. Therefore it is necessary to arouse interest in the future specialists with perspective of work on ice-breakers since students' times, to develop correspondent stimuli. I think it is useful after the III<sup>d</sup> Year to create groups from the best students for future work on ice-breakers and ice-breaker-transport vessels. The owners of such vessels could conclude long-term contracts with them paying the raised scholarship, guaranteeing to the families after graduation of the higher educational institution the official housing and wages higher than those on transport foreign shipping vessels upon written obligation to work in the direction for not less than 5 years. A lot of them will understand and warm to work on vessel of ice navigation during this time and connect with them the future work. Our old captains of icebreakers who started their career from the junior command duties and did not wish to change to the transport vessels can serve as an example.

On 25-29<sup>th</sup> of October 2010 in London the 54<sup>th</sup> Session of Subcommittee IMO in construction and equipment of vessels (DE54) was conducted in General Headquarters.

One of the most important matters considered by Sub-committee was preparation of the draft of the compulsory Polar Code of IMO.

The first variant of such Code, Guidelines for Ships Operating in Arctic Polar Waters - Polar Guidelines, was published in the beginning of 2000-yrs. Requirements for the ice breaking ships, its engines, mechanisms and facilities, navigation, rescue and firefighting equipment, completion of the crew and its provision, maintenance, emergency equipment, etc. were formulated in it in detail. Drawbacks of these Guidelines are only absence of a typical preparatory course for navigators of icebreaking ships and requirements to their qualification. The document has a recommendation character and, as far as I know, is little-known in our country.

It is considered that the legally compulsory Polar Code will be adopted by IMO in 2014.

And another document- developed in 2006 under leadership of German classification society Germanischer Lloyd - IACS Unified Requirements for Polar Class Ships. Unified standards of the vessel projects

and their propulsion systems designated for work in the Arctic Region are described in the document. Shipbuilding requirements compulsory for members of IACS are established depending on thickness of ice which are differentiated according to vessel ice-classes which will be maintained all year round or during autumn-spring navigation in polar waters under conditions of various or combined thickness, strength and age of ice:

Adoption of these documents, their realization, despite the enormous financial expenses, will make a large contribution into navigation safety provision in freezing seas on the whole and on the Northern Sea Route, particularly.

## REFERENCES

1. Приказ министерства транспорта Российской Федерации от 17 января 2013 г. №7 «Об утверждении Правил плавания в акватории Северного морского пути». (Russian). [Prikaz ministerstva transporta Rossiyskoy Federatsii ot 17 yanvarya 2013 g. №7 «Ob utverzhdenii Pravil plavaniya v akvatorii Severnogo morskogo puti»]. Order of the Ministry of Transport of the Russian Federation dated 17 January 2013 number 7, “On Approval of the Rules of sailing in the waters of the Northern Sea Route”.

2. Чесноков И. Севморпуть вне закона /Электронный ресурс// Волна. - 2006. - 16 мая. <http://dikson.narod.ru/aticle/sevmorput.html> (Russian). [Chesnokov I. Sevmorput vne zakona /Elektronnyy resurs// Volna. - 2006. - 16 maya. <http://dikson.narod.ru/aticle/sevmorput.html> ]. Chesnokov, I. (2006, May 16). Northern Sea Route is outlaw. *Volna*. Retrieved from <http://dikson.narod.ru/aticle/sevmorput.html>

3. Смирнов С.М. О некоторых проблемах освоения Арктики в XXI веке. В сб.: «О проблемах освоения Арктики в XXI веке. Материалы экспертного круглого стола 4 мая 2012 г.» – Владивосток, Изд-во Морского государственного университета им. Г.И.Невельского, 2012. С. 5-12.(Russian). [Smirnov S.M. O nekotorykh problemakh osvoyeniya Arktiki v XXI veke. V sb.: «O problemakh osvoyeniya Arktiki v KHKHI veke. Materialy ekspertnogo kruglogo stola 4 maya 2012 g.» – Vladivostok, Izd-vo Morskogo gosudarstvennogo universiteta im. G.I.Nevel'skogo, 2012. S. 5-12]. Smirnov, S.M. (2012). Some problems of the Arctic in the XXI century. *Proceedings of the Expert Roundtable of 4 May 2012. The problems of the Arctic in the twenty-first century*. Vladivostok: MSU(N), pp. 5-12.