



TSB Recommendation M21-01

Risk mitigation measures for passenger vessels operating in Canadian Arctic coastal waters

The Transportation Safety Board of Canada recommends that the Department of Transport, in collaboration with the Department of Fisheries and Oceans, develops and implements mandatory risk mitigation measures for all passenger vessels operating in Canadian Arctic coastal waters.

Marine transportation safety investigation report	M18C0225
Date the recommendation was issued	21 May 2021
Date of the latest response	December 2024
Date of the latest assessment	March 2025
Rating of the latest response	Satisfactory Intent
File status	Active

Summary of the occurrence

On 24 August 2018, the passenger vessel *Akademik Ioffe*, with 163 persons on board, ran aground on an uncharted shoal 78 nautical miles north-northwest of Kugaaruk, Nunavut. The grounding occurred while sailing through narrows in a remote area of the Canadian Arctic that was not surveyed to modern or adequate hydrographic standards, and where none of the vessel crew had ever been. The vessel ran aground at a speed of 7.6 knots before the bridge team could take evasive action; team members were not closely monitoring the echo sounders, and the steady decrease of the under-keel water depth went unnoticed for more than 4 minutes, because the echo sounders' low water depth alarms had been turned off. The bridge team of the *Akademik Ioffe* considered that the narrows were safe to transit, did not expect to encounter any shoal in the area where the vessel ran aground, and consequently did not implement any additional precautions.

Multiple aeronautical search and rescue assets from the Canadian Armed Forces and maritime search and rescue assets from the Canadian Coast Guard were tasked to assist the distressed vessel. The vessel self-refloated with the flooding tide later that day, and its passengers were evacuated and transferred to the passenger vessel *Akademik Sergey Vavilov* the next day. While

no injuries were reported, the *Akademik Ioffe* sustained serious damage to its hull and some of the vessel's fuel oil was released into the environment.

The Board concluded its investigation and released report M18C0225 on 21 May 2021.

Rationale for the recommendation

The gradual retreat of sea ice in the coastal waters surrounding the Canadian Arctic Archipelago has led to a notable increase in the number of passenger-carrying vessels and, particularly, of expedition-type cruises. The decrease in sea ice coverage allows passage into areas outside of the main corridors that are less travelled or where vessels have not been before, and for which there may be limited hydrographic information, increasing the risk of encountering uncharted hazards. By 2019, only 14% of the coastal waters surrounding the Canadian Arctic Archipelago had been surveyed to modern or adequate hydrographic standards, and efforts to augment the surveys have been focused primarily on the main shipping corridors, with no timeline for completion in other areas of the Arctic.

The Canadian Arctic is vast and sparsely populated, which means that response to a marine occurrence may not occur in as timely a manner as it would in more populated areas. Even in summer, near-freezing air temperatures can prevail in some areas of the Canadian Arctic; these conditions make it challenging for survivors of a vessel abandonment.

Since 1996, there have been 3 groundings of passenger vessels and 1 of a chartered yacht in the Canadian Arctic. Although this number seems low, it is high in relation to the number of passenger voyages over this period. TSB investigations into 3 of these occurrences found that deficiencies in voyage planning or execution were significant contributing factors to the occurrences. Moreover, in the groundings of the *Clipper Adventurer* and the *Akademik Ioffe*, there was a lack of appreciation by the masters and bridge teams of the limitations of the hydrographic data on the routes they were following. According to the International Maritime Organization, voyage planning, which includes assessing, planning, executing, and monitoring the voyage, is a key mitigation strategy against the inherent risks of Arctic navigation.

The master has full discretion as to how the bridge team carries out the 4 steps in the making and execution of the vessel's voyage plans, and needs to give bridge teams the latitude to act according to the vessel's actual situation. It is difficult to mitigate against any weaknesses within a plan, given the discretion masters have when deciding where the vessel goes, how an assessment is carried out, and how the watchkeeping is set up. In light of this, it is critical that operators of passenger-carrying vessels operating in the Canadian Arctic adopt additional mitigation strategies to address the risks associated with their itineraries and the potential weaknesses within their voyage plans, such as vetting by a third party or sharing safe itineraries among operators. Given the limitations of current hydrographic surveys in many areas, risks related to navigation in Canadian Arctic waters will remain high for the foreseeable future, and the potential for catastrophic results related to loss of life and irreparable damage to the environment is particularly concerning.

Transport Canada regulates navigation of domestic and foreign vessels within Canada's territorial waters, including the coastal waters surrounding the Canadian Arctic Archipelago. Fisheries and Oceans Canada, through the Canadian Hydrographic Service, is responsible for meeting Canada's international obligation to provide hydrographic services; the Canadian Coast Guard is responsible for the provision of marine search and rescue resources, traffic monitoring, icebreaker assistance and diffusion of navigation safety information, among other services.

Transport Canada and Fisheries and Oceans Canada, combined, have the regulatory mandate to implement various risk mitigation measures to reduce the likelihood and consequences of a passenger vessel running aground in Arctic waters. These measures could include, among others:

- systematically requiring more detailed inspections of domestic and foreign-flagged passenger vessels intending to enter the Northern Canada Vessel Traffic Services zone, to confirm adequate navigational practices, procedures, and equipment;
- prohibiting passenger vessels from transiting Canadian Arctic coastal waters that are not surveyed to adequate hydrographic standards, and allowing passages only within the Canadian Hydrographic Service-identified primary and secondary low impact shipping corridors;
- mandatory carriage of additional navigational aids (with suitably qualified crew to operate and maintain them) such as forward-looking sonar;
- a requirement to use a spotting craft to survey the waters ahead of the passenger vessel when transiting;
- mandatory use of supernumerary navigational experts with local knowledge of the passenger vessel's area of operations;
- a requirement for operators to schedule itineraries so that there is always another passenger vessel in proximity to aid in case of an emergency; and
- working with operators to develop a tool or common registry for the sharing of best practices and navigational information about past, current, and proposed itineraries.

This investigation determined that operating in the Canadian Arctic has unique risks that require additional mitigation measures in order to ensure the safety of passenger vessels, and to protect the vulnerable Arctic environment. Until the coastal waters surrounding the Canadian Arctic Archipelago are adequately charted, and if alternate mitigation measures are not put in place, there is a persistent risk that vessels will make unforeseen contact with the sea bottom, putting passengers, crew, and the environment at risk.

The Board therefore recommended that

the Department of Transport, in collaboration with the Department of Fisheries and Oceans, develops and implements mandatory risk mitigation measures for all passenger vessels operating in Canadian Arctic coastal waters.

TSB Recommendation M21-01

Previous responses and assessments

August 2021: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

As part of TC's work to increase safety oversight for passenger vessels in Canadian Arctic waters, the department is working to implement an enhanced oversight plan for cruise vessels entering Canada's Arctic coastal waters, which will increase the level of monitoring and inspections by 2022. Inspections will focus on voyage/passage planning and bridge resource management. This plan will ensure that that passenger vessels meet the requirements under the International Maritime Organization's (IMO) International Code for Ships Operating in Polar Waters (the Polar Code) as incorporated by reference in the *Arctic Shipping Safety and Pollution Prevention Regulations*.

In addition, under the Paris Memorandum of Understanding (MoU) on Port State Control (PSC) of which Canada is a member, cruise vessels will be inspected for compliance with the Polar Code. This Inspection Campaign is scheduled to take place during the summer of 2022.

As an additional oversight measure and to increase safety awareness for voyage planning in the Arctic, TC will also disseminate a Ship Safety Bulletin (SSB) to remind stakeholders, including cruise operators, of the *Navigation Safety Regulations, 2020* and of the requirement for the annual edition of Notice to Mariners (NOTMAR) to be on board all vessels in Canadian waters. The SSB will also include a notice to the marine industry and cruise operators, advising them of Transport Canada's 2022 enhanced oversight inspection plan for passenger vessels entering Canadian Arctic waters.

The latest NOTMAR's section on "Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters" publication will be updated by Transport Canada prior to the SSB's dissemination.

The Department of Fisheries and Oceans-Canadian Hydrographic Service (DFO-CHS) and the Canadian Coast Guard's *Northern Canada Vessel Traffic Services Zone Regulations* (CCG-NORDREG) Marine Communication Traffic Services are working with Transport Canada to explore how to effectively monitor and communicate major vessel deviations in Canadian Arctic waters.

DFO-CHS, through its technical expertise in Geographic Information System technologies, will support TC in its ability to define risk levels for planned routes for passenger vessels traveling in Canada's northern waters in order to inform risk mitigation for passenger vessels that deviate from their standard routes in the Canadian Arctic.

In response to a request by the TSB for further information, TC sent the following response in December 2021.

Recommended Mitigation Measure	TC Considerations	Expected Implementation Date
<p>Systematically requiring more detailed inspections of domestic and foreign-flagged passenger vessels intending to enter the Northern Canada Vessel Traffic Services zone, to confirm adequate navigational practices, procedures, and equipment.</p>	<p>Transport Canada is working on the following to address this measure:</p> <ul style="list-style-type: none"> • Transport Canada will review passenger vessel voyage plans. This will be done by: <ul style="list-style-type: none"> ○ Reviewing environmental scans to build a preliminary list of vessels planning voyages for the upcoming season. This is done by: <ul style="list-style-type: none"> ▪ Reviewing open-source information ▪ Checking cruise travel websites ▪ Checking with known cruise operator's websites to see if they have planned voyages ▪ Contacting Agents that we have dealt with in the past to see what vessels they will/may represent ▪ Contacting vessel operators if there is no known agent to verify with ▪ This information is cross-referenced with MSOC East searches ○ Transport Canada will communicate with the companies we expect to be planning voyages to obtain voyage plans in advance. ○ MCTS receives notifications from MSOC 96 hours in advance <ul style="list-style-type: none"> ▪ We will be able to interact with vessels at the 96-hour mark ○ When not able to obtain in advance, vessels' voyage plans will be required when they enter the NORDREG Zone (under CSA 2001) <ul style="list-style-type: none"> ▪ They will be reviewed at this point at the latest ○ Transport Canada will work with NORDREG to make sure that we are aware of any major deviations to the original sailing plan (<i>Northern Canada Vessel Traffic Services Zone Regulations</i>) while the vessel is in Canadian Waters. ○ In addition to the mandatory NORDEG sailing plan report, Transport Canada will request and review the voyage plan developed by the vessel for compliance with Chapter 11 of the Polar Code. ○ Transport Canada will work with Other Government Departments to determine 	<p>The inspection campaign will begin when cruise vessels enter Canadian Arctic waters in 2022</p>

	<p>acceptable risk mitigation measures to incorporate in the development of guidelines for Marine Safety Inspectors.</p> <ul style="list-style-type: none"> • There will be an Inspection Campaign (IC) on the implementation of the Polar Code in 2022 sailing season under the Paris MOU. Transport Canada will dedicate resources to conduct compliance inspections and Port State Control (PSC) inspections under the Paris MOU on as many cruise ships as possible and practicable that ply Canadian Arctic waters. These inspections will prioritize the oversight of navigational practices, procedures, and equipment. <ul style="list-style-type: none"> ○ As per the relevant Paris MOU Guidelines ○ TCMSS PNR will coordinate with the Atlantic and Pacific regions to ensure information is shared from Port State Control (PSC) and Coasting Trade inspections done on vessels prior to entering Arctic waters. ○ TCMSS PNR will also coordinate with functional leads in HQ on receiving notifications regarding PSC and <i>Coasting Trading Act</i> inspections. 	
Prohibiting passenger vessels from transiting Canadian Arctic coastal waters that are not surveyed to adequate hydrographic standards, and allowing passages only within the Canadian Hydrographic Service-identified primary and secondary low impact shipping corridors.	<p>Transport Canada is working on the following to address this measure:</p> <ul style="list-style-type: none"> • Transport Canada inspectors, under AWPPA and CSA 2001, have the power to direct the vessel. When inspectors find deficiencies, TC may use a range of enforcement actions, depending on the severity of the infraction such as: requiring corrective measures within a specified period, allowing the vessel to proceed to another port for repairs or ban the vessel from re-entry <ul style="list-style-type: none"> ○ Transport Canada has regulatory powers under <i>Canada Shipping Act 2001</i>, section 211 and under section 15 of the <i>Arctic Waters Pollution Prevention Act</i> ○ Voyage plans for passenger vessels will be requested and reviewed by Transport Canada. Based on the level of charting on the proposed routes, further inspections or oversight may be undertaken using the powers outlined above. • The Northern low impact shipping corridors are not defined by CHS, but rather are developed under Transport Canada leadership. Transport Canada continues to work closely with industry and Arctic stakeholders to develop a governance model for Northern Low-Impact Shipping Corridors that promotes safe shipping while mitigating impacts on 	2022 cruise shipping season and ongoing.

	<p>the environment and identifying sensitive geographic areas.</p> <ul style="list-style-type: none"> ○ Unlike southern shipping corridors, ice conditions are variable year after year and present significant challenges to operators. Masters of vessels, with the assistance of Ice Navigators as the case may be, are required to make navigational decisions based on ice conditions, vessels specific parameters and their expert knowledge. For this reason, it is important that Low-Impact Shipping Corridors are developed in a way that takes these operational challenges into consideration and that they are developed in collaboration with industry experts. 	
<p>Mandatory carriage of additional navigational aids (with suitably qualified crew to operate and maintain them) such as forward-looking sonar.</p>	<ul style="list-style-type: none"> • These are example of best practices in navigation that may help mitigate risk. Transport Canada believes that rather than be prescriptive about best practices in risk mitigation, to foster ideas from industry on innovations and incorporate those into best practices and guidelines. • This is an example of risk mitigation to manage risk in an Arctic voyage plan. <ul style="list-style-type: none"> ○ Link to the best management practices that are laid out in the <i>Guidelines for Passenger Vessels Operating in the Canadian Arctic - TP 13670</i>: http://www.tc.gc.ca/eng/marinesafety/guidelines-passenger-vessels-operating-canadian-arctictp13670e.html 	N/A
<p>A requirement to use a spotting craft to survey the waters ahead of the passenger vessel when transiting.</p>	<ul style="list-style-type: none"> • There are best practices in navigation that may help mitigate risk in certain situations. Transport Canada believes that rather than be prescriptive about best practices in risk mitigation, to foster ideas from industry on innovations and incorporate those into best practices and guidelines. • This is an example of risk mitigation to manage risk in an Arctic voyage plan. <ul style="list-style-type: none"> ○ Link to the best management practices that are laid out in the <i>Guidelines for Passenger Vessels Operating in the Canadian Arctic - TP 13670</i>: http://www.tc.gc.ca/eng/marinesafety/guidelines-passenger-vessels-operating-canadian-arctictp13670e.html 	N/A
<p>Mandatory use of supernumerary navigational</p>	<p>The following is in place to address this measure:</p> <ul style="list-style-type: none"> • The best management practices that are laid out in the <i>Guidelines for Passenger Vessels Operating in the</i> 	N/A

<p>experts with local knowledge of the passenger vessel's area of operations.</p>	<p><i>Canadian Arctic - TP 13670</i> were identified during consultations with representatives of Canadian Arctic communities and other stakeholders and are in addition to the mandatory regulatory requirements.</p> <ul style="list-style-type: none"> ○ Having these included in a passenger vessel's voyage plan would be accepted as a risk mitigation measure for managing risk during an Arctic voyage. ○ Under the best management practices, it is also recommended that vessels interact with communities to have local knowledge. ○ Link to the best management practices that are laid out in the <i>Guidelines for Passenger Vessels Operating in the Canadian Arctic – TP 13670</i>: http://www.tc.gc.ca/eng/marinesafety/guidelines-passenger-vessels-operating-canadian-arctictp13670e.html <ul style="list-style-type: none"> • Currently, all ships 500 GT and above (SOLAS and non-SOLAS alike) operating in the Canadian Arctic regions must have a Polar Ship Certificate and officers qualified for operations in polar waters. Accordingly, the Master and Mates need to hold the appropriate certificates of proficiency for operating in Polar Waters as per Chapter 12 of the Polar Code and the STCW Convention. Please also refer to SSB No. 01/2018 which explains how masters, deck officers and any other crew member can meet certification and familiarization training requirements for those on certain ships operating in polar waters. <ul style="list-style-type: none"> ○ Link to SSB: https://tc.canada.ca/en/marinetransportation/marine-safety/ship-safetybulletins/how-meet-stcw-requirements-mastersdeck-officers-other-crew-members-certaincanadian-ships-operating-polar-waters-ssb-no-01-2018 	
<p>A requirement for operators to schedule itineraries so that there is always another passenger vessel in proximity to aid in case of an emergency.</p>	<ul style="list-style-type: none"> • These are best practices in navigation that may help mitigate risk in certain situations. Transport Canada believes that rather than be prescriptive about best practices in risk mitigation, to foster ideas from industry on innovations and incorporate those into best practices and guidelines. • This is an example of risk mitigation to manage risk in an Arctic voyage plan. <ul style="list-style-type: none"> ○ Link to the best management practices that are laid out in the <i>Guidelines for Passenger Vessels Operating in the Canadian Arctic – TP 13670</i>: 	<p>N/A</p>

	http://www.tc.gc.ca/eng/marinesafety/guidelines-passenger-vessels-operating-canadian-arctictp13670e.html	
Working with operators to develop a tool or common registry for the sharing of best practices and navigational information about past, current, and proposed itineraries.	<p>Transport Canada is working on the following to address this measure:</p> <ul style="list-style-type: none"> • TC will disseminate a Ship Safety Bulletin (SSB) to remind stakeholders, including cruise operators, of the <i>Navigation Safety Regulations, 2020</i> and of the requirement for the annual edition of Notice to Mariners (NOTMAR) to be on board all vessels in Canadian waters. The SSB will also include a notice to the marine industry and cruise operators, advising them of Transport Canada's 2022 enhanced oversight inspection plan for passenger vessels entering Canadian Arctic waters. <ul style="list-style-type: none"> ◦ TCMSS PNR is working with HQ to finalize this • The latest NOTMAR's section on "Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters" publication will be updated by Transport Canada prior to the SSB's dissemination. <ul style="list-style-type: none"> ◦ Annual Notice to Mariners, section 7A- Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters which is a required publication to be carried on board the vessels (as per <i>Navigation Safety Regulations</i>), identifies Arctic's unique conditions, navigational challenges and the fact that most of Canada's Arctic waters has not been surveyed to modern standards. The publication is to assist mariners, owners and operators of vessels intending on navigating in Canada's northern waters in preparing for, and executing, a safe voyage. This publication will be updated to better reflect new ASSPPR/Polar Code and voyage planning in the Arctic. • Transport Canada has committed to improving the awareness of cruise ship operators and has developed cruise ship guidelines that are intended to provide information on the requirements of Federal and Territorial government agencies during the planning phase of cruises and during the subsequent Arctic voyages. • Link: https://tc.canada.ca/en/marine-transportation/marine-safety/guidelines-operation-passenger-vessels-canadian-arctic-waters-tp-13670-e • Transport Canada is supporting (as co-chair) the Arctic Council PAME working group Arctic Shipping Best Practice Information Forum. The Forum supports the 	Before the start of the 2022 Cruise shipping season in the Canadian Arctic and ongoing.

	<p>implementation of the IMO Polar Code and to facilitate the exchange of information and best practices on a broad range of Arctic shipping topics, including but not limited to; hydrography, search and rescue, communications, training, industry guidelines and ship equipment, systems and structure.</p> <p>https://pame.is/arcticshippingforum</p>	
--	--	--

August 2021: response from Fisheries and Oceans Canada

DFO and CCG agree in principle with this recommendation.

The report highlights that there are still many areas of the Canadian Arctic not yet surveyed and charted to modern hydrographic standards. Given the challenges of surveying in the Arctic, the Canadian Hydrographic Service (CHS) has focused on opportunistically surveying waters in proposed low impact shipping corridors. It will be years before the proposed low impact shipping corridors will be adequately charted to modern standards and the pace at which these gaps can be filled depend on several factors including resources.

DFO and CCG recognize that risks in Canadian Arctic coastal waters will persist even once low impact shipping corridors are fully charted as ships may deviate from the currently proposed low impact shipping corridors.

DFO-CHS and CCG are working with TC to explore a number of risk mitigation measures for passenger vessels, including the formation of a task team on how to effectively monitor and communicate major vessel deviations in Canadian Arctic waters.

DFO-CHS, through its technical expertise and Geographic Information System technologies, will support TC in its ability to define risk levels for planned routes for passenger vessels in Canada's northern waters in order to inform risk mitigation measures for passenger vessels that deviate from their standard routes in the Canadian Arctic.

In response to a request by the TSB for further information, DFO and CCG sent the following response in December 2021.

Canadian Hydrographic Services (CHS) will continue to work with other Arctic countries to document chart adequacy in the Arctic and raise awareness of risks. On November 10, 2021, Canada, through the CHS, rotated in as Chair of the International Hydrographic Organization's Arctic Regional Hydrographic Commission (ARHC). The ARHC brings together hydrographic offices from Arctic nations to improve regional coordination of hydrographic work, share best practices, enhance exchange of information and foster training and technical assistance. At the most recent meeting, Canada shared the results of the Transportation Safety Board Investigation Report on the *Akademik Ioffe*. In May 2021, the ARHC partnered with the Arctic Council to publish a Joint Statement on Hydrography in the Arctic Region to highlight the importance of hydrography in the Arctic region to safe and sustainable maritime navigation. ARHC will be working with the Arctic Council's Protection of the Arctic Marine Environment

Working Group to support Arctic maritime safety and the protection of the Arctic marine environment. Of note, there will be efforts to develop and disseminate information along the lines of the Arctic Navigation Risk summary bulletin issued by ARHC in 2017.

The Canadian Coast Guard also continues to expand its commitment to support Arctic maritime safety and the protection of the Arctic marine environment. Coast Guard icebreakers provide safe escorts to ships through ice-covered waters, conducting hydrographic surveys, maintaining navigational aids, and supporting Arctic science programs in addition to search and rescue activities.

With an extended Arctic season that allows for Canadian Coast Guard icebreakers to be in the Arctic earlier and later in the season, it now deploys up to eight Coast Guard icebreakers from June to November to support maritime safety, vessel traffic, and operational and program commitments. In addition to search and rescue, all Coast Guard icebreakers working in the Arctic are equipped and ready to deal with emergency issues such as marine pollution incidents. Preparedness and readiness activities such as contingency planning, personnel training and exercising, as well as liaison with our response partners are ongoing throughout the year.

The Canadian Coast Guard also provides daily updates on ice conditions and icebreaker operations to industry and partners throughout the shipping season. This information is essential to a successful marine shipping season in the Arctic.

The support provided by Marine Communications and Traffic Services (MCTS) Centre in Iqaluit is key to keeping northern waters safe. The Iqaluit MCTS Centre provides communication services in the Arctic including: safety radio-communication services; vessel traffic services and regulation; information that supports marine activities; screening of vessels entering Canadian waters; a 24/7 commercial marine telephone call service; performs Alert and Warning Network (AWN) desk duties; and provides Navigational Warning services.

As part of work supporting the Canadian Hydrographic Service (CHS), five Coast Guard vessels have the capabilities to support seabed mapping. Through state-of-the-art multi-beam systems, hydrographers are increasing the amount of seafloor surveyed in the Arctic. Hydrographic data acquired will allow the CHS to produce and update nautical charts and publications for Arctic waters, contributing directly to safer navigation in the region. A total of 33,650 km² was surveyed in the Arctic in 2021, through the use of Coast Guard vessels, contracted surveys and an autonomous surface vessel.

Further to the search and rescue capabilities of Coast Guard icebreakers, the Canadian Coast Guard's Inshore Rescue Boat station in Rankin Inlet, Nunavut provides maritime search and rescue services and has completed its fourth season of operation. In addition, in 2017 as part of the Oceans Protection Plan, the Canadian Coast Guard launched the Indigenous Community Boat Volunteer Pilot Program. This program provides Indigenous communities with funding to purchase boats and equipment to build up their on-water search and rescue capacity.

In May 2021, the Minister of Fisheries, Oceans and the Canadian Coast Guard announced the construction of two Polar icebreakers. Both new Polar icebreakers will have capacity and ability beyond that of Canada's current largest icebreaker, the CCGS *Louis S. St-Laurent*. With their enhanced capabilities, these larger, more powerful Polar icebreakers will enable the Coast Guard to conduct year-round operations in Canada's Arctic. Their greater endurance will ensure they can operate at higher latitudes for longer periods, and will allow the fleet to better respond to maritime emergencies in the Arctic.

March 2022: TSB assessment of the response (Satisfactory in Part)

Transport Canada (TC) and Fisheries and Oceans Canada (DFO) indicate that they agree and agree in principle, respectively, with the recommendation. The responses received from TC and DFO indicate that they are working together to address the risks of passenger vessel traffic in the Canadian Arctic.

Transport Canada

Transport Canada states that it will review voyage plans for compliance with the Polar Code and work with NORDREG to monitor any major deviations while these vessels are in Canadian Waters. Additionally, the department will update the latest Notice to Mariners' section on "Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters" and will publish a Ship Safety Bulletin reminding operators of the requirements and informing them of the enhanced oversight.

TC also mentions it will enhance oversight of Arctic cruise vessels through an Inspection Campaign which will begin in 2022. This Campaign will prioritize the implementation of the Polar Code, including appropriate navigational practices, procedures, and equipment, on cruise ships in the Canadian Arctic. Furthermore, TC indicates that it co-chairs the Arctic Council's Protection of the Arctic Marine Environment (PAME) working group which facilitates the exchange of information and best practices for various Arctic shipping topics. Finally, TC plans to promote development of mitigation measures from within the industry, notably through the PAME forum. Although some of these measures are not new, such as inspections under Port State Control, the Board acknowledges that their enhancement may contribute in reducing the identified safety deficiency.

The Board notes TC's plans to conduct enhanced inspections under the Paris Memorandum of Understanding on Port State Control. Given that the *Akademik Ioffe* was inspected by TC for the purpose of issuing a Coasting Trade Licence prior to the occurrence voyage, it is unclear whether additional inspections, as well as the coordination of prior inspections, will be sufficient to identify weaknesses in vessels' risk assessment processes. Review of voyage plans could provide an opportunity for TC to identify areas of risk, and require mitigation of those risks through the exercising of powers under the *Canada Shipping Act, 2001* and the *Arctic Waters Pollution Prevention Act*. Other risk mitigation measures proposed by TC will be limited to best practices and guidelines, falling short of the mandatory risk mitigation measures that the Board has recommended.

The Board recognizes that TC has planned some initial steps to address the risks posed by passenger vessel travel in the Canadian Arctic. However, many of the measures proposed by TC are voluntary best practices and do not seem to be under consideration for becoming mandatory. The Board is concerned that until some of these risk mitigation measures are made mandatory, it is unclear how the underlying safety deficiency will be successfully mitigated.

The Board considers TC's response to Recommendation M21-01 to be **Satisfactory in Part**.

Fisheries and Oceans Canada

Fisheries and Oceans Canada, including the Canadian Coast Guard, has described the types of actions it will take to support TC in addressing this recommendation. Fisheries and Oceans Canada, through the Canadian Hydrographic Service (CHS), will define risk levels for planned routes in northern waters, to help inform risk mitigation measures. Over time, the expansion of technology to support seabed mapping will improve the reliability of bathymetric data and provide mariners with more accurate information to better plan their voyages. The CHS' work with PAME is also expected to expand awareness of the risks of travel in poorly or uncharted waters, notably with the proposed publication of a document like the Arctic Navigation Risk summary bulletin issued by the International Arctic Regional Hydrographic Commission in 2017.

From the Canadian Coast Guard, the expansion of search and rescue capacity in the Arctic will help to improve response times to Arctic occurrences. Once delivered, the Coast Guard's growing fleet will also be capable of providing year-round operations and a better response to maritime emergencies in the Arctic.

The Board acknowledges the work that Fisheries and Oceans Canada is doing to provide better quality navigation data, as well as the expansion of Coast Guard resources in the Arctic. Given that DFO's role is not regulatory in this area, these measures can be expected to reduce some of the risks posed by operating in the Arctic environment.

Therefore, the Board considers DFO's response to Recommendation M21-01 to show **Satisfactory Intent**.

The actions that TC and DFO have described do not implement mandatory risk assessment measures. Until these risk mitigation measures are made mandatory, it is unclear how the underlying safety deficiency will be successfully mitigated. Therefore, the Board considers the response to Recommendation M21-01 to be **Satisfactory in Part**.

December 2022: response from Canadian Hydrographic Service

The Canadian Hydrographic Service (CHS) is happy to report on our progress, recognizing this is the first year we provide an update since the report on “Risk mitigation measures for passenger vessels operating in Canadian Arctic coastal waters” was published.¹

For 2022, CHS supported Transport Canada (TC) and Canadian Coast Guard (CCG) by ensuring that they had access to the latest charts. We continued to conduct modern surveys and produce charts to improve chart coverage in the Arctic. We were also available to address any questions related to the quality of charts or survey data in a given area of interest.

In addition, CHS, TC and CCG have initiated discussions regarding the use of automated tools to alert passenger/cruise vessels with a view of supplementing TC’s current approach with new tools.

On the international front, Canada hosted the International Hydrographic Organization’s Arctic Regional Hydrographic Commission (ARHC) in 2022 and CHS continues to work with other Arctic countries to document chart adequacy in the Arctic and raise awareness of risks.

December 2022: response from Transport Canada

Transport Canada is taking steps to mitigate the risks inherent in voyage planning and execution in the remote area which comprises the Canadian Arctic. The actions with respect to Voyage Planning, Risk Identification, and Mitigations (detailed below) have been made mandatory for the 2022 season and will continue to be implemented going forward. Passenger vessels must develop and submit a detailed voyage plan for Transport Canada review prior to entering the Canadian Arctic, and update through their journey while in Canadian waters.

Transport Canada met with passenger vessel representatives pre-season on a weekly basis to communicate issues, concerns, forthcoming safety requirements, and to coordinate between Inuit, Territorial governments, and Government of Canada partners. All passenger vessels were required to submit a detailed voyage plan, identify anticipated risks, and to provide mitigating measures for the latter before being allowed entry into Canadian Arctic waters. These plans, reviewed by Regional Duty Officers, were required at each Zone boundary and on any deviation from the plan provided. Transport Canada attended 12 of the 17 passenger vessels this season and carried out inspections primarily targeting passage planning, execution, and Polar Code requirements. Collaboration between Transport Canada and Canadian Coast Guard partners was enhanced to achieve required levels of oversight and monitoring of these vessels.

¹ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors and accessibility issues in the material it reproduces without indication but uses brackets [] to show other changes or to show that part of the response was omitted because it was not pertinent.

Transport Canada issued [a] notice in the Annual Edition of Notices to Mariners 2022 7A-*Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters*, and Ship Safety Bulletin 18/2022 *Inspecting passenger vessels in Canadian Arctic Waters and Voyage planning* in regard to the TSB recommendation M21-01.

Transport Canada continues to monitor compliance with Polar Code and Navigation Safety Regulations 2020 in the Arctic as part of its risk-based inspection approach.

TC continues to work with industry to ensure they incorporate detailed voyage planning and risk mitigation measures in future years and continue to strictly apply Polar Code requirements. TC will communicate proactively with passenger vessel companies, interacting through regional CMAcs, and continuing a series of regular meetings pre-season to lay out safety expectations and identify areas of concern.

In addition to welcoming voluntary corrective measures from industry, Transport Canada continues to work to ensure that mandatory Voyage Planning, Risk Identification, and Mitigations are applied and that the CSA 2001 is applied for deficiencies. Transport Canada's approach includes an increased awareness of navigation planning and execution that emphasizes the unique operating conditions for passenger vessels in the remoteness of the Canadian Arctic. This approach is coupled with increased monitoring and vessel scrutiny in the Arctic.

The measures detailed above were instituted this season and passenger vessels demonstrated a 100% compliance. Industry accepted the requirements and the 2022 season was incident-free.

TC shares information proactively with Canadian Coast Guard and will continue to work collaboratively to ensure high priority areas are identified and surveyed to modern standards.

Actions taken are pre-emptive collaboration with Industry and government partners, in-depth review of passage planning and risks with mitigating measures, increased monitoring of passenger vessel movements, increased inspections in the Arctic, strict adherence to Polar Code requirements. These actions increased the vessel's awareness of risks, improved planning, supported consideration to reducing those risks, increased the vessels' knowledge of the Arctic, its operating requirements, and its remoteness, increased the monitoring of passenger vessel movements, and demonstrated a greater presence/involvement in ensuring the safety of their operations. Inspections undertaken:

1. 17 passenger ships
2. 31 voyages
3. 12 passenger ships inspected for safety
4. 14 passenger ships inspected for security
5. 0 passenger ships incidents
6. 2 Port State Control inspections

December 2022: response from the Canadian Coast Guard

For 2022, CCG continued its commitment to support Arctic maritime safety and the protection of the Arctic marine environment. Seven (7) Coast Guard icebreakers provided safe escorts to ships through ice-covered waters, conducting hydrographic surveys, maintaining navigational aids, and supporting Arctic science programs in addition to search and rescue activities. Coast Guard icebreakers were in the Arctic earlier and later in the season due to its extended Arctic season from June until well into December 2022. In addition to search and rescue, all Coast Guard icebreakers working in the Arctic were equipped and ready to deal with emergency issues such as marine pollution incidents. Several exercises were conducted with our partners, which was also an important element in our operational readiness and preparedness.

Coast Guard also provided daily updates on ice conditions and icebreaker operations to industry and partners throughout the shipping season. This information was essential to a successful and safe marine shipping season in the Arctic. Another key element in keeping northern Arctic waters safe was the support provided by Marine Communications and Traffic Services (MCTS) Centre in Iqaluit. The Iqaluit MCTS Centre provided marine communication services in the Arctic including: safety radio-communication services; vessel traffic services and regulation; information that supports marine activities; screening of vessels entering Canadian waters; a 24/7 commercial marine telephone call service; performs Alert and Warning Network (AWN) desk duties; and provides Navigational Warning services.

As part of work supporting the CHS, Coast Guard vessels supported seabed mapping. Through state-of-the-art multi-beam systems on board our icebreakers, hydrographers increased the amount of seafloor surveyed in the Arctic in 2022.

In addition, CCG, TC and CHS have initiated discussions regarding the use of automated tools to alert passenger/cruise vessels with a view of supplementing TC's current approach with new tools.

March 2023: TSB assessment of the response (Satisfactory Intent)

Transport Canada

Transport Canada's (TC) response highlights its voyage planning, risk identification and mitigations that became mandatory following coordination and discussions with various stakeholders. In response to this recommendation, TC published Ship Safety Bulletin (SSB) 18/2022, which was made mandatory for the 2022 season and will continue to be implemented going forward. The SSB requires passenger vessels to submit to TC detailed voyage plans 96 hours before entering Canadian Arctic waters and report any voyage changes via an updated voyage plan at least 24 hours in advance. Additionally, navigable areas of the Arctic have been divided into shipping safety control zones as per the *Arctic Shipping Safety and Pollution Prevention Regulations*, and all passenger vessels are required to provide voyage plans before entering one of them, and to advise TC of any deviations. TC inspectors then review the voyage plan, although the extent of this review is unclear.

TC mentions that it continues to work with industry to ensure that the mandatory provisions are employed and that the *Canada Shipping Act, 2001* is applied for deficiencies. The department also continues to share information with the Canadian Coast Guard (CCG), and they work together in increased monitoring of passenger vessel movements. Finally, TC published a significantly expanded *Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters* in the annual edition of Notices to Mariners 2022. TC has demonstrated a significant increase in the risk assessment measures required for passenger vessels operating on Arctic voyages. The TSB will continue to observe the implementation of these measures in order to evaluate their effect on passenger vessel operations in the Canadian Arctic. However, the Board is concerned that many of the measures are implemented outside of the regulatory regime, and may not be enforceable.

Canadian Hydrographic Service

The Canadian Hydrographic Service's (CHS) response indicates that it has continued supporting TC and the CCG by ensuring they have the most up-to-date charts and providing support services. CHS also indicates that it has continued to conduct modern surveys and produce charts to improve coverage of the Canadian Arctic. In addition, it continues to work with international counterparts in order to improve chart adequacy and raise awareness of risks.

Canadian Coast Guard

The CCG's response mentions multiple ways in which it is addressing Arctic safety including the department's ice breaking capabilities, its search and rescue activities, and the regional Marine Communications and Traffic Services (MCTS) Centre in Iqaluit which provides marine communication services in the Arctic. The CCG also highlights its joint work with TC and CHS in seabed mapping through multi-beam systems on board its icebreakers and the development of automatic tools to alert passenger/cruise vessel to supplement TC's work.

The Board acknowledges the work that the CCG and CHS, which are both under the Department of Fisheries and Oceans (DFO), are doing to provide better quality navigation data, as well as the expansion of CCG resources in the Arctic. These measures can be expected to reduce some of the risks posed by operating in the Arctic environment.

The Board is encouraged by the numerous initiatives taken by TC regarding this recommendation, and the collaboration taking place between TC and DFO in implementation efforts. However, there are remaining questions about the enforceability of these initiatives in the absence of a regulatory approach. Further evaluation of the implementation of these risk assessment measures and how voyage plans are assessed is required in order to determine if the underlying safety deficiency has been mitigated. The Board considers the response to Recommendation M21-01 to show **Satisfactory Intent**.

November 2023: response from the Canadian Coast Guard

Regarding M21-01, CCG's [Canadian Coast Guard's] Marine Navigation Program and DFO's [Department of Fisheries and Oceans'] Canadian Hydrographic Service (CHS) are working to

explore how major passenger vessel deviations in the Canadian Arctic waters can be communicated to Transport Canada (TC).

DFO-CHS is broadening its portfolio of digital services, including the integration of the most recent standards (IHO S-100) and Geographic Information System technologies. These advancements aim to assess the hydrographic risk associated with planned shipping routes in Canada's northern waters. This initiative is designed to assist TC in both responding to and mitigating risks related to passenger vessels plotting courses in these northern waters. In the medium term, we foresee the implementation of geofencing technology for Arctic route monitoring.

CCG continues its commitment to support Arctic maritime safety and the protection of the Arctic marine environment providing icebreakers to support safe escorts to ships through ice-covered waters, conducting hydrographic surveys, maintaining navigational aids, and supporting Arctic science programs in addition to search and rescue activities.

Coast Guard also provides daily updates on ice conditions and icebreaker operations to industry and partners throughout the shipping season. This information is essential to a successful and safe marine shipping season in the Arctic. As well, the CCG's Marine Communications and Traffic Services (MCTS) Centre in Iqaluit provides marine communication services in the Arctic including: safety radio-communication services, vessel traffic services and regulation, information that supports marine activities, screening of vessels entering Canadian waters, a 24/7 commercial marine telephone call service, performs Alert and Warning Network desk duties, and provides Navigational Warning services.

As part of work supporting the CHS, Coast Guard vessels continue to support seabed mapping. Through state-of-the-art multi-beam systems on board our icebreakers, hydrographers are increasing the modern bathymetry coverage every summer in the vast Canadian Arctic.

Please see Appendix A for a more detailed response to specific questions.

Annex 1

CHS has been working with both Transport Canada Marine Safety and Security and the Canadian Coast Guard (CCG) to ensure both groups have access to up-to-date information including modern navigation charts produced and maintained by CHS, and also to communicate how CHS is prioritizing efforts to undertake surveys and produce charts in the Proposed Low Impact Shipping Corridors. Outside of these corridors, the accuracy of CHS charts, and underlying data are of lower quality, and contain larger areas with limited or no modern data. DFO-CHS have been successful to in securing important investments from the Government of Canada through the renewal of the Ocean Protection Plan (OPP). In 2022, The Minister of DFO announced \$89M of funding over 9 years to support modern Arctic Hydrography. The funding has allowed CHS to build upon the success of work done in the Arctic during the first 5 years of OPP, and will see CHS undertake bathymetric surveys to increase the proportion of Arctic waters surveyed to modern standards, along with the production and update of modern

nautical charts, which will follow international standards and provide a foundation for future S-100 services (e-Navigation).

Given the finite resources (funding and availability of survey vessels), the CHS continues to focus our efforts (and funding) on undertaking surveys of the Proposed Low Impact Shipping corridors, which continue to see the majority of commercial shipping traffic in the Arctic. This approach has been communicated to Transport Canada, and colleagues at CCG have access to updated CHS nautical charts and data.

Outside of these corridors, CHS is undertaking remote sensing analysis to determine if satellite imagery and data is able to provide sufficient information to identify and communicate risk to vessels planning their voyages, and while they are navigating Arctic waters. CHS has not yet completed remote sensing efforts of large areas, nor operationalized new products that may be able to communicate potential risk of navigation beyond what may already be portrayed in existing nautical charts. Further work is needed with Transport Canada on how future products and services including digital tools delivered via web-based geographic information systems (GIS) may be tested and implemented.

CHS has also been collaborating internationally via the International Hydrographic Organization (IHO) Arctic Region Hydrographic Commission (ARHC). Member states share responsibility for surveying and charting their territorial Arctic waters. ARHC has undertaken an Arctic Hydrographic Risk analysis, which was updated in 2023, and included contributions from CHS.

CHS is also benefiting from accessing and assessing satellite-derived Automatic Identification System (AIS) data in Arctic waters, which is able to provide an increasingly accurate picture of where different types of vessels travel in the Arctic, along with year-over-year changes. Use of this data is helping to indicate the areas where passenger vessels are in transition, and can help to prioritize either improvements to existing charts or collection of modern bathymetric or remotely sensed data.

DFO-CHS will continue to leverage the incremental funding from OPP2 to expand on the coverage of modern hydrographic services in the Arctic. By 2027, CHS is aiming to have surveyed 60% of the Proposed Low Impacting Shipping corridors, and create modern electronic navigation charts (ENCs) that meet international standards to cover 50% of those corridors.

CHS continues to work closely with Transport Canada and CCG to ensure they have the latest and most up-to-date information regarding CHS chart coverage, the adequacy and accuracy of these charts, as well as the underlying bathymetric data.

Over the next year (2024), CHS will engage directly with TC Marine Safety and Security, and CCG to gather user requirements, and initial use cases of a possible GIS automated tool to qualify the hydrographic risk of planned routes.

In the longer term, further effort is required to determine if automated decision support tools could be developed to monitor the real-time movements (via various sensors including satellite

AIS) of passenger vessels transition the Canadian Arctic, and to alert when these vessels either deviate from expected voyage plans, or approach poorly-charted or higher-risk areas of Arctic waters. These alerts could prompt either relevant government organizations to proactively notify the vessel to ensure the Master is aware of risks and has a plan in place to either mitigate navigation risk or return to previous/planned voyage plan.

By 2027, CHS, CCG and TC will have tested and deployed a prototype web-enabled GIS tool, which is accessible to relevant government departments to better inform their ongoing surveillance and monitoring of passenger vessels transiting the Canadian Arctic.

December 2023: response from Transport Canada

Transport Canada (TC) is taking steps to mitigate the risks inherent in voyage planning and execution in the remote area which comprises the Canadian Arctic. The actions with respect to Voyage Planning, Risk Identification, and Mitigation measures continued to be mandatory for the 2023 season and will continue going forward. These measures require passenger vessels to develop and submit a detailed voyage plan for TC's review prior to entering the Canadian Arctic and update it throughout their journey while in Canadian waters based on requirements found in the *Canada Shipping Act 2001* and the *Arctic Waters Pollution Prevention Act*.

Voyage plans require that the risks related to navigating in the Canadian Arctic, including the limitations of hydrographic and bathymetric, are taken into careful consideration when developing any such plan. Should TC's review of the plan reveal any gaps or concerns, TC officials will request clarification from the vessel's Master.

TC reviewed voyage plans and risk mitigation measures for 212 vessels throughout the 2023 season and carried out inspections on 9 of 21 passenger vessels that reported to NORDREG. This oversight activity targeted passage planning, execution, and Polar Code requirements.

TC also conducted considerable outreach with stakeholders through regular meetings and publications regarding the navigation hazards in the Canadian Arctic, and the need for risk mitigation measures. These include the PNR [Prairies and Northern Region] and National CMAC [Canadian Marine Advisory Council] meetings, the *Guidelines for Passenger Vessels Operating in the Canadian Arctic – TP 13670* (currently under revision), the Canadian Coast Guard's Annual Notices to Mariners 2023 (Section 7A – *Voyage planning for Vessels intending to Navigate in Canada's Northern Waters*), and Ship Safety Bulletin 18/2022 (*Inspecting passenger vessels in Canadian Arctic Waters and Voyage Planning*):

- *Guidelines for Passenger Vessels Operating in the Canadian Arctic – TP 13670* (canada.ca)²

² <https://tc.canada.ca/en/marine-transportation/marine-safety/guidelines-passenger-vessels-operating-canadian-arctic-tp-13670>

- Annual Edition - Notice - A7A (notmar.gc.ca)³
- *Inspecting passenger vessels in Canadian Arctic Waters and Voyage planning – SSB No.: 18/2022* (canada.ca)⁴

There are also enhanced collaboration efforts between TC and CCG partners such as MCTS Managers, Officers at NORDREG, and Officers and Superintendents at the Ice Operations Centers through regular meetings and agreements regarding how requests are managed and on procedures. TC shares information proactively with the Canadian Coast Guard and will continue to work collaboratively to ensure high priority areas are identified and surveyed to the latest standards.

This achieved increased levels of oversight and monitoring of passenger vessels. The measures detailed above were instituted for the 2022/2023 season and passenger vessels demonstrated increased compliance. Industry accepted the requirements, and both the 2022 & 2023 seasons were incident-free.

TC continues to work with industry to ensure the incorporation of detailed voyage planning and risk mitigation measures, as well as other related Polar Code requirements. TC will communicate proactively with passenger vessel companies, interacting through regional CMACs, and will continue regular meetings to lay out safety expectations and identify areas of concern as required.

TC will continue to work to ensure that mandatory Voyage Planning, Risk Identification, and Mitigation measures are conducted by vessel masters, and to ensure adherence with the requirements of the CSA, 2001. It will also continue with its enhanced oversight posture to encourage compliance with the risk mitigation measures required for safe transits through the Arctic.

TC also notes that the proposed *Marine Safety Management System Regulations* (MSMSR), scheduled for publication in early 2024, will expand the requirements for safety management systems to include the vessels captured by this recommendation. The need to develop safety management systems accounting for the risks to safe operation of the vessels will introduce an additional layer of safety and should reduce the likelihood and severity of marine incidents and accidents in the North.

March 2024: TSB assessment of the response (Satisfactory Intent)

Department of Fisheries and Oceans (Canadian Coast Guard and Canadian Hydrographic Service)

The Canadian Coast Guard's (CCG) response indicates that it continues its support of Arctic maritime safety by providing icebreakers to support safe ship travel in ice-covered waters,

³ <https://www.notmar.gc.ca/publications/annual/section-a/a7a-en>

⁴ <https://tc.canada.ca/en/marine-transportation/marine-safety/ship-safety-bulletins/inspecting-passenger-vessels-canadian-arctic-waters-voyage-planning-ssb-no-18-2022>

conducting hydrographic surveys, maintaining navigational aids, supporting Arctic science programs, and search and rescue activities. CCG also continues to provide daily updates on ice conditions and icebreaker operations and supports the Canadian Hydrographic Services (CHS) in seabed mapping.

CHS indicates that it is exploring various technologies and analysis, such as Automatic Identification System (AIS) and remote sensing analysis, to gather vessel traffic data to be able to identify vessels deviating from planned routes, particularly when a vessel may be moving into an area that is less reliably charted or that poses a higher risk for another reason. Additionally, CHS will be broadening its portfolio of digital services, which will include the integration of recent standards (IHO S-100) and Geographic Information System (GIS) technologies. Until these services can help with risk assessing planned shipping routes, CHS foresees implementing geofencing technology for Arctic route monitoring.

In the next year, CHS plans to work with CCG and Transport Canada to gather user requirements to develop initial use cases of a possible GIS automatic tool to qualify risk of planned routes. A prototype of this web-enabled GIS tool is planned to be tested and deployed by 2027. By the same year, CHS also aims to have surveyed 60% of the Proposed Low Impact Shipping corridors to create modern navigational charts.

The Board is encouraged by the various initiatives that the CCG and CHS, which are both under the Department of Fisheries and Oceans (DFO), are taking to reduce, assess, and identify risks in Arctic waters. The TSB will continue to monitor the implementation of these measures in order to evaluate their effect on passenger vessel operations in the Canadian Arctic.

Transport Canada

Transport Canada's (TC) response indicates that its published Ship Safety Bulletin (SSB) 18/2022, which was made mandatory for the 2022 season, will continue to be implemented going forward. This will require passenger vessels, prior to entering the Canadian Arctic, to develop a plan that will be reviewed by TC. TC has also conducted outreach with stakeholders and enhanced collaboration efforts with TC and CCG partners such as MCTS managers, officers at NORDREG, and officers and superintendents at the Ice Operations Centers.

Finally, TC also notes that the proposed *Marine Safety Management System Regulations* (MSMSR), currently scheduled for publication in the *Canada Gazette*, Part II, in early 2024, will expand the requirements for safety management systems to include the vessels captured by this recommendation.

The Board is encouraged by the various initiatives being taken by DFO and TC in addressing this recommendation. Further evaluation of the implementation of these risk assessment measures, how voyage plans are assessed and the new MSMSR is required in order to determine if the risk associated with the underlying safety deficiency has been mitigated. The Board considers the response to Recommendation M21-01 to show **Satisfactory Intent**.

Latest response and assessment

December 2024: response from the Canadian Coast Guard

Regarding M21-01, CCG [Canadian Coast Guard] continues to be dedicated to ensuring Arctic maritime safety and environmental protection. CCG supports these efforts by using icebreakers to safely escort ships through icy waters, providing vessel traffic monitoring and communication services, supporting hydrographic surveys, maintaining navigational aids, and supporting scientific programs in the Arctic, along with providing search and rescue services.

Throughout the Arctic shipping season, CCG delivers daily updates on ice conditions and icebreaker operations to industry and partners, ensuring a safe and well-coordinated marine season. General routes are provided daily through the Marine Communications and Traffic Services (MCTS) and the e-Navigation portal. Specific routing is also available on demand.

Additionally, CCG's MCTS Centre in Iqaluit provides essential communication services, including safety radio-communications, vessel traffic services and regulation, screening of vessels entering Canadian waters, and 24/7 commercial marine communication services, along with issuing Navigational Warnings. MCTS has been supporting measures implemented by Transport Canada requiring passenger vessels to submit detailed voyage plans in the Arctic. MCTS [has also been] ensuring ships meet the stricter requirements before receiving the Northern Canada Vessel Traffic Services Zone (NORDREG) Advance Reporting Requirements clearance.

CCG is also working towards the modernization of its marine navigation services and advancing digital navigation tools, such as real-time navigation data, to enhance the accuracy and efficiency of Arctic navigation.

Please see Appendix A for a more detailed response from both CCG and CHS related to this recommendation.

Appendix A

The Canadian Coast Guard (CCG) agrees with Recommendation M21-01. CCG is committed to ensuring safe and efficient maritime operations and to enhancing marine navigation safety in the Canadian Arctic.

DFO-CHS [Department of Fisheries-Oceans and Canadian Hydrographic Service] agrees with the recommendation in the Transportation Safety Board report (M21-01) related to risk mitigation measures for passenger vessels transiting the Canadian Arctic.

CHS has been working with both Transport Canada Marine Safety and Security and CCG Marine Communications and Traffic Services to ensure both groups have access to up-to-date information including modern navigation charts produced and maintained by CHS, and also to communicate how CHS is prioritizing efforts to undertake surveys and produce charts in the Proposed Low Impact Shipping Corridors. Outside of these corridors, the accuracy of CHS charts

and underlying data are of lower quality, and contain larger areas with limited or no modern data.

CCG continues to be dedicated to ensuring Arctic maritime safety and environmental protection. CCG supports these efforts by providing icebreaking services to safely escort ships through icy waters, providing vessel traffic monitoring and communication services, supporting hydrographic surveys, maintaining navigational aids, and supporting scientific programs in the Arctic, along with providing search and rescue services.

DFO-CHS has been actively involved in addressing this recommendation through the creation of the S-421 Route Risk Assessment Task Force.

The task force has made substantial progress in automating the extraction of route coordinates from provided ship voyage plans, facilitating the creation of a comprehensive risk matrix. This matrix is designed to assess and mitigate hydrographic risk associated with planned Arctic routes. The team has successfully tested a prototype with multiple routes and is now focusing on finalizing the risk matrix and refining the output from the risk assessment.

The CHS has been actively involved in international efforts, hosting the Arctic Regional Hydrographic Commission (ARHC) and working with other Arctic nations to assess chart adequacy and increase risk awareness in the region. These initiatives demonstrate a commitment to improving the safety and sustainability of passenger vessel operations in the Canadian Arctic.

Overall, the actions taken by the CHS, in collaboration with TC and CCG, reflect a comprehensive approach to addressing the TSB's recommendations and ensuring the safety of vessels transiting the Canadian Arctic.

CCG will continue to work with Transport Canada and the CHS to ensure a comprehensive monitoring of vessel traffic in the Arctic, using up-to-date information and providing domain awareness.

CCG is also working towards the digitalization of marine navigation services, which will allow for real-time information sharing through advanced communication systems. As it modernizes services, CCG will continue to ensure navigational safety and efficiency in the Arctic. CCG will focus on leveraging digital systems and tools to enhance safety in the Arctic. This includes the development and use of smart vessel traffic management systems that will allow for better tracking and navigational guidance in remote regions. Additionally, CCG is advancing the use of virtual aids to navigation, which are adaptable to the changing Arctic environment. These measures will improve information exchange with vessels and reduce navigational risks, ensuring that operators are well-informed about safe routing options.

The primary purpose of the Arctic Route (S-421) Hydrographic Risk Assessment Service Task Team is to explore innovative ways to mitigate the hydrographic risk associated with planned Arctic routes and develop a working prototype in response to TSB Recommendation M21-01. The task team aims to design and develop an innovative working prototype that automatically

qualifies hydrographic risk of planned Arctic routes leveraging the emerging S-421 standard. This initiative ensures the safety and sustainability of planned Arctic routes in compliance with Transport Canada, the Canadian Hydrographic Service and the Canadian Coast Guard policies. The task team has created a work plan outlining the timeline, milestones, deliverables, and responsibilities.

The task team includes representatives from Transport Canada, the Canadian Hydrographic Service, and the Canadian Coast Guard, as well as other key stakeholders as deemed necessary. Members have expertise in hydrography, navigation, maritime safety, and risk assessment. Their roles and responsibilities include actively participating in all meetings, contributing their expertise and insights, collaboration in the risk assessment, and developing the working prototype. They also ensure that the task team's activities align with their organization's policies and guidelines.

Meetings are held bi-monthly or as required. The task team reports on its progress regularly to the respective heads of Transport Canada, the Canadian Hydrographic Service and the Canadian Coast Guard. The timeline for the action plan is divided into several phases. The initial phase, from March 2024 to May 2024, involved the formation of the task team, initial meetings, and setting up objectives and roles. The development phase, from June 2024 to September 2024, focused on designing and developing the working prototype, conducting risk assessments, and testing the prototype. The fine-tuning phase, from October 2024 to December 2024, involves finalizing the risk matrix, refining the output from the risk assessment, and implementing the prototype. Finally, the review and reporting phase, from January 2025 to March 2025, includes reviewing the progress, making necessary adjustments, and reporting the outcomes to the respective heads.

This action plan outlines the structured approach the task team is taking to address the recommendation in the TSB report and ensure the safety of passenger vessels transiting the Canadian Arctic.

CCG will continue to provide its essential icebreaking, aids to navigation and MCTS services to ensure safe and efficient navigation in the Arctic. CCG will continue to work towards the modernization of its marine navigation services, and advancing digital navigation tools, such as real-time navigation data, to enhance the accuracy and efficiency of Arctic navigation.

The maritime industry has increasingly adopted digital navigation systems. This aligns with CCG's efforts to modernize its communication and traffic management systems, providing better support for vessels navigating Arctic waters.

The Arctic operating environment is witnessing increased commercial and passenger traffic, necessitating improved navigational tools. CCG's enhancements to ice reporting, vessel traffic services, and digital communication will help mitigate these challenges by offering more accurate and timely information.

CCG continues to enhance navigation safety through the use of advancing navigational aids, smart vessel traffic management systems, and improved ice condition reporting.

More specifically, significant strides have been made to advance Arctic safety and address Recommendation M21-01 through a combination of new measures and ongoing initiatives.

Since summer 2022, passenger vessels are now required to submit voyage plans to Transport Canada (TC) before entering Arctic waters. Voyage plans must include a detailed plan identifying planned passage as well as potential risks and mitigating strategies. Passenger vessels must also submit a signed and completed attestation of compliance. TC reviews these plans and provides guidance to the Marine Communications and Traffic Services (MCTS) on specific requirements for each vessel, ensuring better oversight and navigation safety. NORDREG clearance is dependent on TC's confirmation of compliance. CCG's MCTS Centre in Iqaluit has been supporting these measures from TC and is ensuring the ships meet the stricter requirements before receiving NORDREG clearance. These combined efforts have significantly improved safety standards in the Arctic.

In addition, Notice to Mariners 7A Voyage Planning for Vessels Intending to Navigate in Canada's Northern Waters was updated to align with the *Arctic Shipping Safety and Pollution Prevention Regulations* (ASSPPR) and the Polar Code, enhancing voyage planning in the Arctic.

CCG's ongoing digital transformation reflects the need to adapt to the changing Arctic environment and increased maritime traffic. The shift towards digital navigation tools has enhanced the accuracy and timeliness of navigation data. This modernized approach, alongside the requirement for passenger vessels to provide MCTS and TC with updated voyage plans, has created a more structured and reliable framework for Arctic navigation. These changes allow for better risk anticipation and response, improving overall safety for vessel operation in this remote region.

CCG's vessel monitoring data shows a steady rise in vessel compliance with Arctic navigation requirements, as more vessels adhere to recommended routes and submit voyage plans that align with updated requirements. The use of Automatic Identification System (AIS) data has revealed a decrease in route deviations, with vessels increasingly following established corridors, demonstrating improved adherence to safe navigation practices. These indicators demonstrate a meaningful decrease in residual risk, highlighting the success of coordinated safety initiatives in the Arctic.

December 2024: response from Transport Canada

Transport Canada (TC) has taken substantial actions to address Recommendation M21-01. These actions have resulted in high compliance rates and a corresponding increase in levels of safety, as evidenced by an absence of related incidents in Canadian Arctic waters over the past six years since the grounding of the *Akademik Ioffe* in 2018, and the issuance of the TSB recommendation in 2021.

TC has implemented additional oversight and risk mitigation frameworks to enhance voyage planning and safety in the Canadian Arctic. This complements the already robust ship safety and pollution prevention regime unique to the Canadian Arctic as set out under the *Arctic Waters Pollution Prevention Act*, the *Arctic Shipping Safety and Pollution Prevention Regulations*, the *Northern Canada Vessel Traffic Services Zone Regulations*, and the range of standards and guidance material developed to assist mariners operating in ice conditions and at high latitudes. Passenger vessels must now submit to TC detailed voyage plans, identify anticipated risks and hazards, and outline mitigation strategies to reduce these risks—all of which Regional Duty Officers (RDOs) review as part of year-round, 24/7 monitoring.

TC has also regularly issued notices in the *Annual Edition of Notices to Mariners* and through *Ship Safety Bulletins* to address this (and other) TSB recommendations relevant to the Arctic. TC has developed work instructions to help guide Marine Safety Inspectors (MSIs), authorized representatives, and masters of passenger vessels operating in the Canadian Arctic on the preparation of voyage plans that take into consideration TC's risk-based review approach. In addition, TC requires passenger vessels to submit an Attestation of Compliance confirming that a vessel's voyage plan is in conformity with applicable legislative and regulatory requirements.

To communicate this oversight regime to stakeholders, TC regularly engages with authorized representatives of passenger vessels throughout the season while fostering collaboration with Inuit, Territorial Governments, and other federal partners. Risk mitigation strategies and expectations for operating in Arctic waters are communicated through individual meetings, electronic documentation, and via the Prairie and Northern Region Canadian Marine Advisory Council (CMAC). These efforts are further complemented by enhanced collaboration with the Canadian Coast Guard (CCG), the inspection of 29 passenger vessels over the last three years for compliance, and active participation in the Canadian Hydrographic Service's Arctic Route Hydrographic Risk Assessment Service Task Team to address hydrographic risks and improve navigation safety.

Recent and upcoming regulatory initiatives are anticipated to further enhance Arctic oversight, including through more prescriptive *Northern Canada Vessel Traffic Services Zone Regulations* (NORDREG) reporting, the expansion of certain Polar Code requirements (e.g. navigation safety and voyage planning) for non-SOLAS vessels, and increased monetary penalties of up to \$250,000 for violations of the *Arctic Shipping Safety and Pollution Prevention Regulations*. These measures will help improve monitoring, compliance, safety, and environmental protection in polar waters. In addition, TC actively engages within both the Arctic Council and the International Maritime Organization (IMO) to enhance vessel safety in the Canadian Arctic and contribute to the ongoing strengthening of the Polar Code.

TC also notes the coming into force of the *Marine Safety Management System Regulations* (MSMSR) in July 2024. The MSMSR require the authorized representative of a Canadian vessel to identify the Ship Manager, defined as a qualified person who is responsible for managing the shore-based and on-board operations of a vessel. This Ship Manager must develop, implement and maintain a documented safety management system that addresses the shore-based and on-board operations of the vessel. Emergency preparedness, which would include identifying

potential emergency situations and developing programs for drills and exercises to prepare for these emergencies, is an important component of the required SMS, ensuring captain and crew are prepared to respond at any time to hazards and emergency situations in accordance with the type of vessel operation. All Canadian Class 2, 3, and 4A passenger vessels must comply with these regulations within the year starting on 03 July 2025, thereby including the Canadian passenger vessels captured by this recommendation.

TC's comprehensive compliance framework, proactive oversight, and inspection regime establish a strong foundation for Arctic cruise vessel safety. Through a combination of education, industry collaboration, and regulatory enforcement, TC has ensured the safety of vessels, crews, and passengers.

Based on the safety actions taken, improvements in the operating environment, and zero incidents over the past six years, TC believes that the residual risk in Arctic cruise vessel operations is low. These factors, combined with strengthened regulatory measures, ensure a robust safety framework, allowing TC to recommend that the TSB close Recommendation M21-01.

March 2025: TSB assessment of the response (Satisfactory Intent)

Department of Fisheries and Oceans (Canadian Coast Guard and Canadian Hydrographic Service)

The Canadian Coast Guard's (CCG) response indicates that it continues its support of Arctic maritime safety by providing icebreakers to support safe ship travel in ice-covered waters, conducting hydrographic surveys, maintaining navigational aids, supporting Arctic science programs, and search and rescue activities. CCG also continues to provide daily updates on ice conditions and icebreaker operations and supports the Canadian Hydrographic Service (CHS) in seabed mapping.

The Board is encouraged by the various initiatives that, through the CCG and CHS, the Department of Fisheries and Oceans (DFO) is taking to reduce, assess, and identify risks in Arctic waters. In particular, the Arctic Route Hydrographic Risk Assessment Service Task Team is a collaborative step to mitigate the risk with Arctic routes and the TSB would appreciate receiving a copy of the completed report. Once the report is published, the Board will review any new measures in order to evaluate their effect on passenger vessel operations in the Canadian Arctic. The Board considers the response to Recommendation M21-01 to show **Satisfactory Intent**.

Transport Canada

The Board appreciates the overview of Transport Canada's (TC's) efforts in addressing Recommendation M21-01 and the comprehensive measures being implemented to enhance safety and compliance in the Canadian Arctic, particularly the proactive oversight and risk mitigation frameworks introduced for voyage planning and operations.

The Board notes that in the *Marine Safety Management System Regulations* (MSMSR), all Canadian Class 2, 3, and 4A passenger vessels must comply with these regulations within 12 months of 03 July 2025. This will expand the requirements for safety management systems to include the Canadian vessels captured by this recommendation.

The new and upcoming regulatory initiatives, including more stringent reporting requirements with NORDREG, the expansion of Polar Code requirements, and the *Marine Safety Management System Regulations*, further strengthen voyage planning and therefore safety in Arctic waters.

The Board is encouraged by the various initiatives being taken by TC in addressing this recommendation. The Board will review the report produced by the Arctic Route Hydrographic Risk Assessment Service Task Team, once published, to determine if the risk associated with the underlying safety deficiency has been mitigated. The Board considers the response to Recommendation M21-01 to show **Satisfactory Intent**.

File status

The TSB will continue to monitor the progress made by TC and DFO.

This deficiency file is **Active**.