

REPORT

Marine 2019/03



REPORT ON MARINE ACCIDENT – AURORA EXPLORER, IMO NO. 9196723 ALLISION WITH QUAY AND PASSENGER INJURIES, BARENTSBURG, SVALBARD 15 JULY 2018

AIBN has compiled this report for the sole purpose of improving safety at sea. The object of a safety investigation is to clarify the sequence of events and root cause factors, study matters of significance for the prevention of maritime accidents and improvement of safety at sea, and to publish a report with eventually safety recommendations. The Board shall not apportion any blame or liability. Use of this report for any other purpose than for improvements of the safety at sea shall be avoided.

This report has been translated into English and published by the Accident Investigation Board Norway (AIBN) to facilitate access by international readers. As accurate as the translation might be, the original Norwegian text takes precedence as the report of reference.

Photo of ferry on the Norwegian west coast: Bente Amandussen

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NOTIFICATION OF THE ACCIDENT

On 15 July 2018 at 11.05, the Accident Investigation Board Norway (AIBN) was notified by the Joint Rescue Coordination Centre North-Norway (JRCC-N) about an accident that had occurred while a passenger catamaran was docking at a quay in Barentsburg, Svalbard. Personal injuries were reported, but there were no environmentally harmful spills to the sea. After clarification with the Faroe Islands (the flag state), two accident investigators left the AIBN for Longyearbyen, Svalbard on 22 July to interview the crew and meet the Norwegian Maritime Authority's representative and the Governor of Svalbard. The AIBN initiated a safety investigation into the incident.

As the Faroe Islands does not have its own independent accident investigation board, it was agreed that Norway, represented by the AIBN, would lead the investigation. Many of the passengers were French citizens, so the French accident investigation board was an affected party during the investigation.

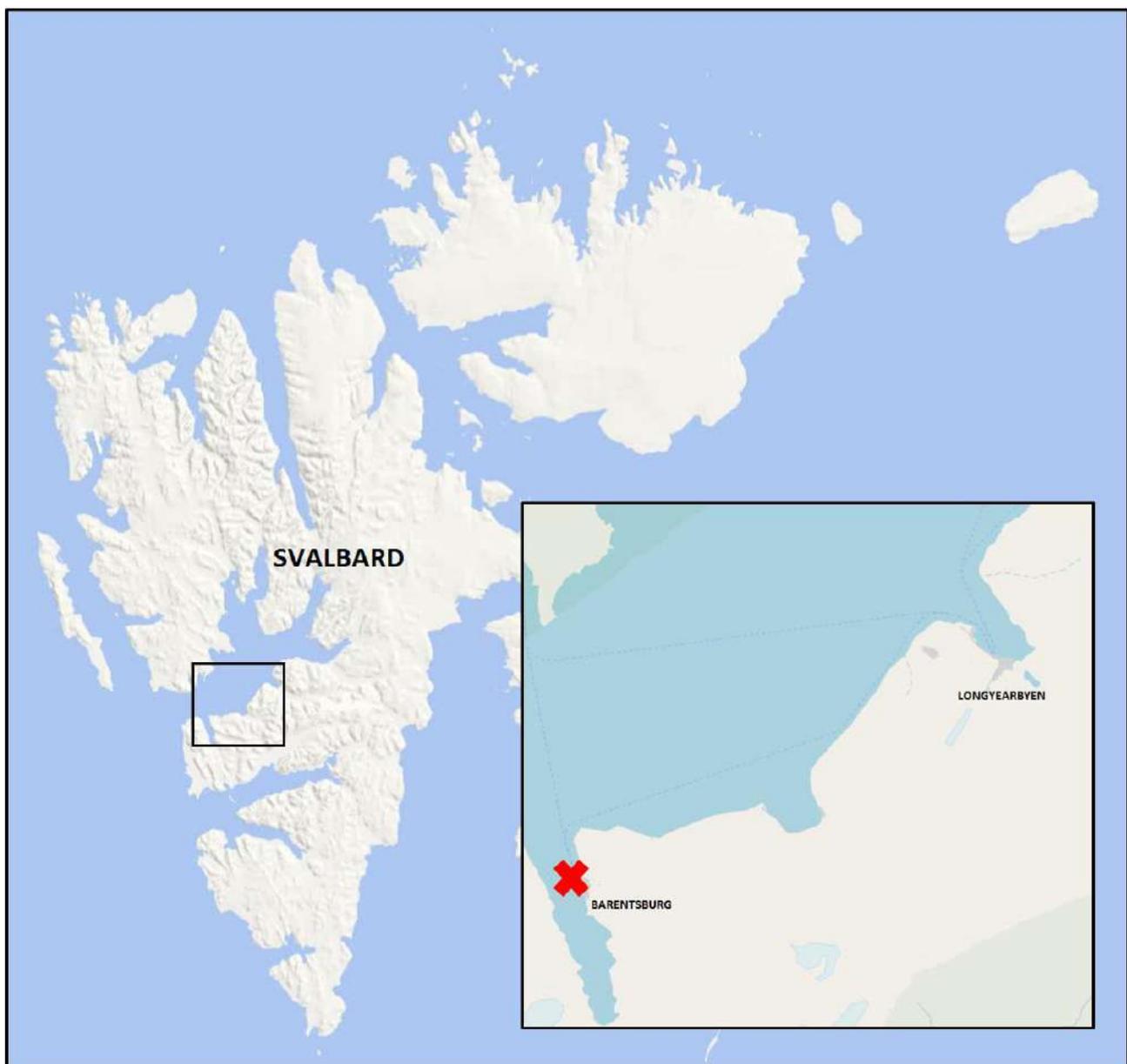


Figure 1: The accident site. Map: © Norwegian Mapping Authority/AIBN

SUMMARY

On 15 July 2018 *Aurora Explorer* collided with the quay while docking at Barentsburg. Many of the 125 persons on board, mainly French pensioners, were standing on the open deck during arrival. Many of them fell during the collision with the quay. Almost one third of the passengers and one crew member suffered varying degrees of injury.

In the winter 2018, a service engineer overhauled the engine gearbox, but the supplier of the manoeuvring system was not contacted to ensure optimal adjustment of pitch and loading. The port drivelines propeller pitch was not correctly adjusted after this gearbox overhaul. This caused severe stress at certain rpm settings and vibrations in the vessel.

Challenges caused by vibrations in the vessel on cruising speed continued when the vessel had started to operate around Svalbard. The responsible for the vessel did themselves try to readjust the system. When this was not successful, it was decided to operate *Aurora Explorer* in combinator mode during docking, and in back-up mode to reach cruising speed between destinations, in order to limit unwanted vibrations.

If the manoeuvre system still was in back-up mode on arrival Barentsburg on 15 July with forward pitch on the port driveline, the rpm would have increased as the port side manoeuvre handle was pulled astern, and the vessel would as a result also increase its speed ahead.

The AIBN's investigation has shown that the shipping company did not document the potential risks to passengers and crew from the change in operational mode.

In order to ensure the safety of passengers and crew on board, the AIBN submits a safety recommendation to Arctic Explorer AS, in which it requests the company to carry out and document risk assessments when operational changes are made.

1. FACTUAL INFORMATION

The factual information is based on conversations with the vessel's crew, the shipping company, technical investigations on board, test runs with the vessel, JRCC's operations log, the Coastal Administration's AIS log and information obtained from the Norwegian Maritime Authority, the Faroese Maritime Authority and the Governor of Svalbard.

1.1 Sequence of events

The daily summer route for passenger catamaran *Aurora Explorer* was Longyearbyen - Barentsburg - Longyearbyen - Pyramiden - Longyearbyen. At a cruising speed of around 20 knots, the passage between Longyearbyen and Barentsburg usually took 1 hour and 10-15 minutes.



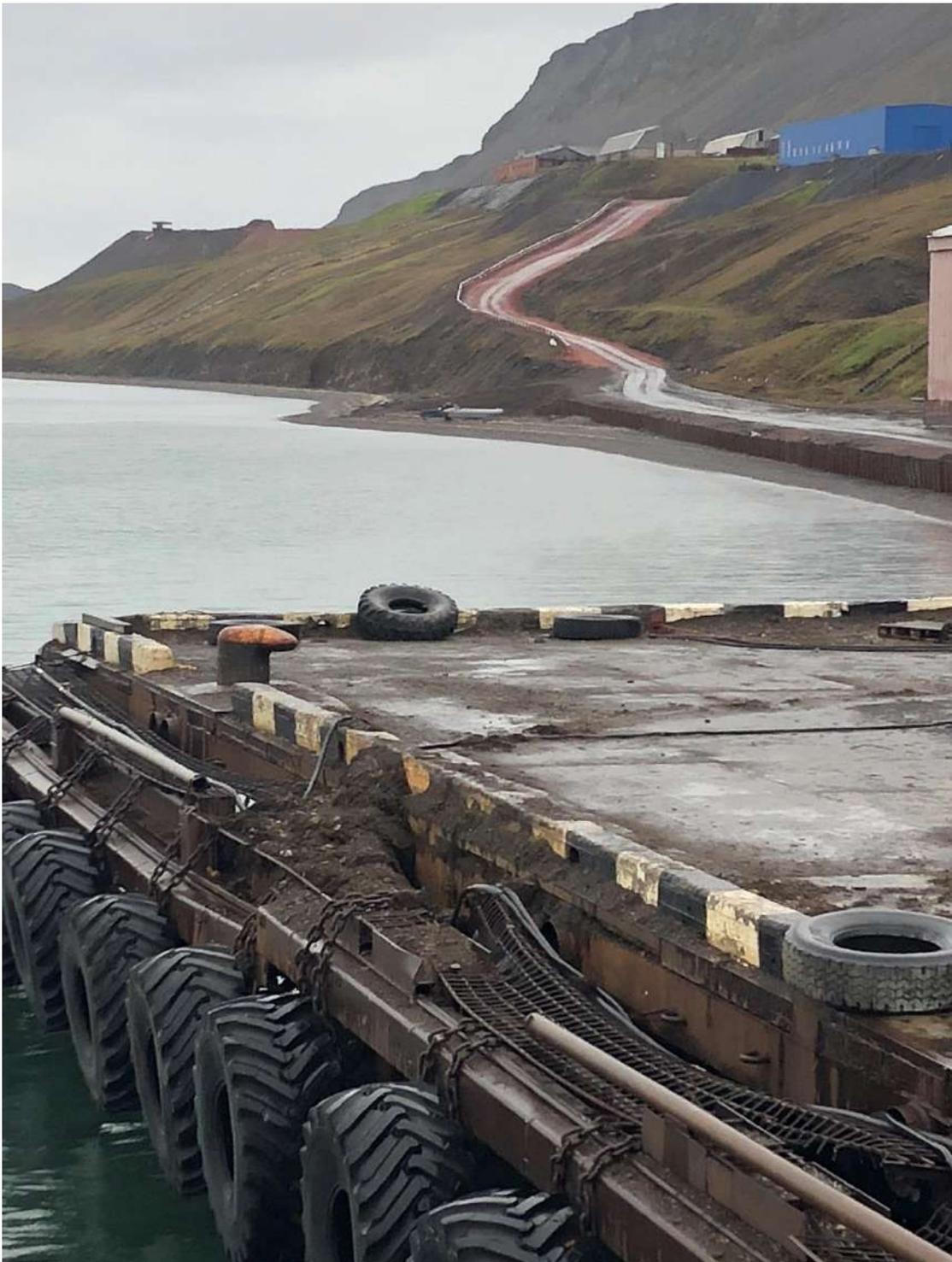
Figure 2: *Aurora Explorer* operating off Svalbard. Photo: Arctic Explorer AS

On Sunday 15 July there were 121 passengers and 4 crew on board, the weather was fine and calm and visibility was good. *Aurora Explorer* left Longyearbyen at 09:00. On the way into Grønfjorden en route to Barentsburg a large number of beluga whales were observed, so many of the passengers were on the open deck before docking at Barentsburg.

The vessel reduced speed to 8-9 knots approximately 6-700 metres from the quay and then reduced speed gradually as it manoeuvred towards the quay.

In Barentsburg there were two places on the main quay, which the vessel could use. The place at the southern end of the quay was already occupied by another passenger vessel. *Aurora Explorer* approached from the north and started a standard U-turn to dock against the quay starboard side to. This was the preferred side, because of the vessel's gangway arrangements. The master broke off the U-turn earlier than usual, in order to avoid a shallower area and keep a safe distance from a vessel lying at the quay astern. *Aurora Explorer* then came relatively parallel in alongside the pier before the planned mooring.

According to the master, speed was reduced to around 3 knots. Around 10-20 metres from the quay, the port engine suddenly increased power. The vessel swung uncontrollably to starboard, which led to the starboard foredeck colliding with the fenders (large rubber tyres) on the concrete quay.



*Figure 3: Quay and fender arrangement at the relevant quay in Barentsburg, Svalbard.
Photo: AIBN*

The submerged part of the starboard hull (the rapier) passed in under the quay. The collision led to passengers and crew being thrown forwards on the open deck and in the saloon below. The vessel sprang back from the fenders after impact, causing people to be thrown about again. The master disengaged both engines immediately after the collision. When he then re-engaged them in combinator mode, the engine, steering and manoeuvre handles functioned normally. *Aurora Explorer* was then moored with her starboard side against the quay. The collision caused injuries of varying severity to 37 passengers and

one crew member. The crew immediately focused on establishing the extent of the damage/injuries and assisting the passengers.

1.2 The rescue operation

Most of the 121 passengers were French pensioners, but some French-speaking crew from a cruise ship visiting Longyearbyen were also on board. These crew members helped to calm the situation and give assistance and first aid to the passengers. After the accident further crew arrived from the vessel that lay astern of *Aurora Explorer*, including several French speakers.

Aurora Explorer's master had ambulance service experience, and he quickly saw the need for external assistance. As they were already alongside the quay, he decided not to send a Mayday call by VHF. He initially rang the police emergency telephone in Longyearbyen and then contacted Coastal Radio North in Bodø. The police activated rescue helicopters with medical teams and the hospital in Longyearbyen was put on emergency alert. Coastguard vessel *KV Andenes* lay alongside the quay in Longyearbyen and launched two of its Seabear RIBs.

All resources were quickly on their way to Barentsburg. The police incident manager and the helicopter's doctor prioritised the order for medical treatment and decided how the injured should be transported. Gradually, all passengers were evacuated from the boat. Those in need of immediate medical treatment were transported up to Barentsburg Hospital, while others were provisionally checked into the local hotel. The most seriously injured were evacuated to Longyearbyen Hospital in the Governor's helicopters. *KV Andenes* transported the remaining passengers back to Longyearbyen.

During this period there was some doubt about whether all passengers were accounted for. It became apparent later that five passengers had returned to Longyearbyen with another vessel, without telling the incident manager.

1.3 Personal injuries

Of the total 125 persons on board, 37 persons, including a crew member, needed medical attention. A total of 19 persons were transferred by helicopter to Longyearbyen for further treatment. There were no life-threatening injuries, but nine passengers and one crew member were sent on to Tromsø University Hospital by air ambulance for further treatment.

1.4 Damage to the vessel

When the port engine increased power, the vessel swung to starboard and the starboard side of the hull took the force of the collision with the fender on the quay. The vessel suffered only minor damage above the waterline, with no water ingress. No emissions/pollution of the sea were recorded.



*Figure 4: Aurora Explorer at the quay in Longyearbyen after the collision. The collision with the quay in Barentsburg caused only minor damage to the starboard hull and searchlight.
Photo: AIBN*

1.5 Weather and sea conditions

Weather data from yr.no show that according to observations from Isfjord Radio the weather at the time of the accident was fine, visibility good, temperature 5.5 °C and a moderate breeze (6.0 m/s) from NNE.

The master reported good visibility, fine weather, little wind en route and on arrival at Barentsburg.

1.6 The crew

The crew comprised the master, engineer, guide and a crew member who looked after the sales counter on board. All worked on a four weeks on/four weeks off rotation. The master has a D5 licence and had varied experience from sailing along the Norwegian coast, as well as several seasons on Svalbard.

1.7 The vessel

Aurora Explorer was originally delivered in 1999 by Oma Båtbyggeri AS, as the high-speed craft *Vågsfjord*. It entered scheduled service along the Norwegian coast.

The vessel was taken over by Arctic Explorer AS in 2014.

Both main engines were confirmed as de-rated¹ on 25 October 2015. This meant that the engines were restricted to 1850 rpm by a limiter programmed into the engine control electronics. The rpm reduction set the maximum speed to below 20 knots at full capacity. *Aurora Explorer* then ceased to be subject to the Regulations of 5 January 1998 No. 6 on the construction, equipment and operation of high-speed craft used as passenger craft or cargo craft. She could therefore be re-registered as a passenger vessel pursuant to the applicable regulations.

The new owner changed the name of the vessel to *Aurora Explorer* on 30 October 2015. The vessel was put into seasonal service transporting tourists for day trips. It operated from Tromsø in winter and on Svalbard from May to September.

On 8 May 2018 the owner transferred the vessel from the NOR register to the Faroe Islands, with a new ownership structure registered in the new flag state.

1.7.1 Follow-up by the authorities and the classification society

After the accident, the Norwegian Maritime Authority issued a permit to operate so that the vessel could return to Longyearbyen for a port state inspection. A test run with the vessel was arranged on 17 July, with the local representative of the Norwegian Maritime Authority, the classification society and the police. The Faroes Islands, as the flag state, was represented by the vessel's classification society RINA. The test included emergency stops and other engine manoeuvres in order to find a reason for the sudden power increase in the port engine. Nothing abnormal was detected.

One theory, advanced by the master, was that the unexpected power increase might have arisen if he had involuntarily pressed the button for constant rpm on the port engine just before arrival at Barentsburg, thus causing rpm to increase unexpectedly.

The Norwegian Maritime Authority therefore introduced an extra cover, as an immediate precaution, to exclude the possibility of unintentional use.

1.7.2 The vessel's manoeuvring system

Aurora Explorer's master informed the AIBN that his standard procedure was to operate the vessel's twin engines and the pitch on the propellers in combinator mode, both while under way and when manoeuvring in to a quay. In this mode, the manoeuvre handles on the console controlled pitch and rpm (power) together, increasing or reducing pitch angle and power, ahead or astern, depending on how far the handles were moved and in which direction.

¹ De-rated: the max engine output is adjusted so that the top speed is below the limit that distinguishes a high-speed craft from a passenger craft.

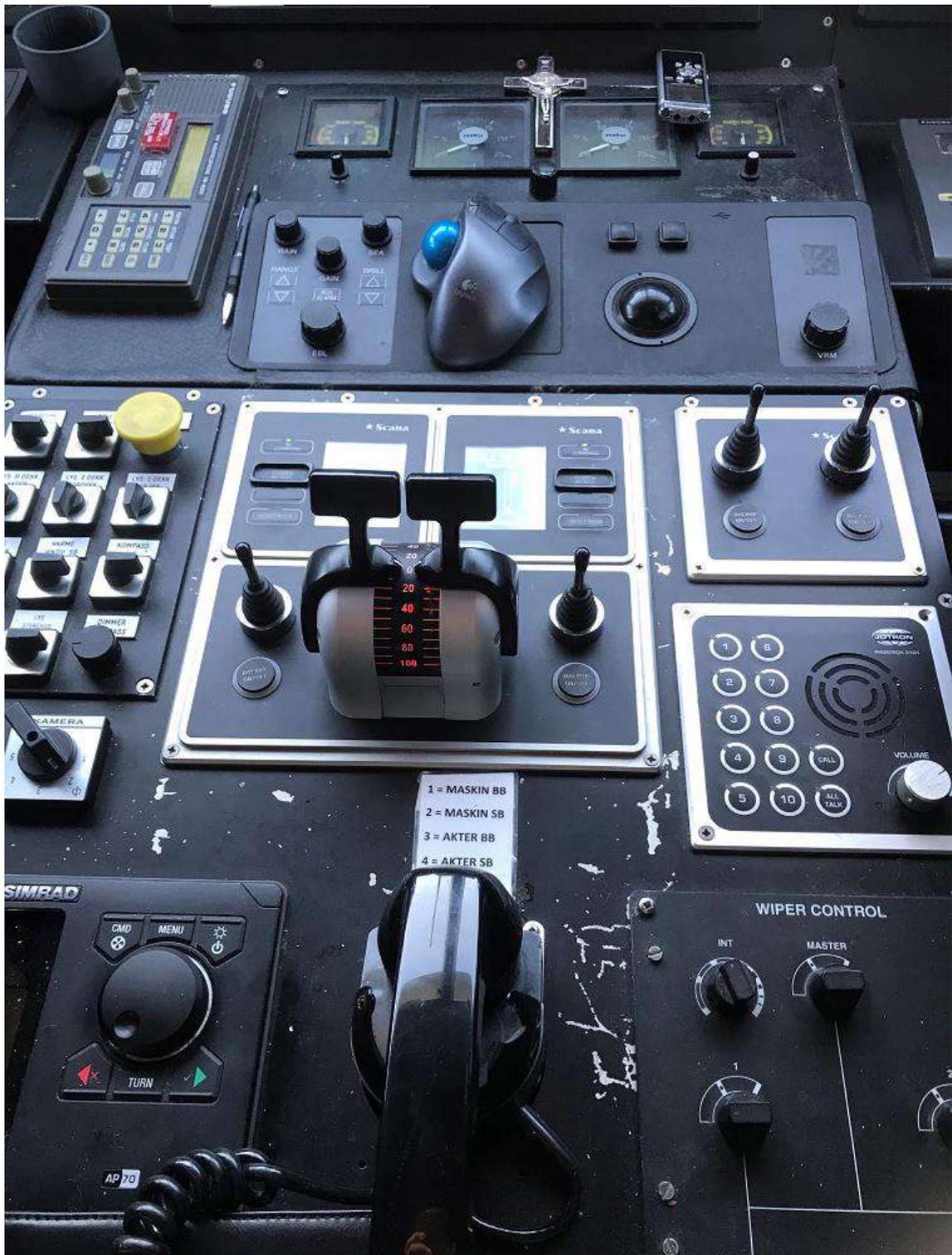


Figure 5: The manoeuvre console on board Aurora Explorer. Photo: AIBN

Alternatively, the drive lines could be set from the manoeuvre console to operate at constant rpm. Then the engines would run at a fixed 1370 rpm and the manoeuvre handles just controlled pitch ahead/astern. Constant rpm could be activated using push switches on the console for the respective drive lines.

The manoeuvre console also offered a third possibility for controlling pitch and rpm. This is described as back-up mode. The supplier of the manoeuvring system described back-up as an alternative operating mode, if combinator or constant manoeuvre modes were

unavailable. In Figure 5, which shows the manoeuvre console, joysticks can be seen on each side of the manoeuvre handles. If back-up mode was selected on one or both of the drive lines, pitch was controlled by the joystick, while rpm was controlled with the manoeuvre handle. Pitch ahead would increase if the joystick was pushed forward, and pitch astern would be increased if the joystick was moved backwards. Rpm/total output increased if the manoeuvre handle was moved forward. Rpm/total output would be at its lowest when the manoeuvre handle was at the null point and would increase again if the handle was then moved backwards.

1.7.3 Problems with the manoeuvring system

The AIBN was informed that as early as when it left Tromsø for Svalbard, the vessel had experienced problems with vibrations while accelerating to cruising speed. The situation continued after arrival at Svalbard where it was identified being connected in some way to pitch and power, especially on the port side. It has been explained that after arriving at Svalbard they had attempted to adjust the manoeuvring system themselves, in order to be able to operate both drive lines in combinator mode. However, they had not succeeded. The AIBN understands that in order to solve the vibration problems, they chose to select back-up mode after manoeuvring away from a quay, and then re-select combinator mode before the next docking. It is believed that the shipping company knew about this.

The procedure in order to reach cruising speed was that both drivelines was engaged in combinator mode to 40-50%. Back-up mode was then chosen and adjusted to correct load parameters. When the vessel should reduce from cruising speed again the procedure was reversed: rpm reduction – pitch reduction – system out of back-up mode and into combinator mode – further reduction of speed was then to be done in combinator mode before finally docking.

The AIBN has received a copy of a nonconformity report dated 25 June 2018, which discusses the problem. However, this report cannot be traced by the person responsible for the safety management system for the vessel. Neither did the person concerned know that the vessel was operated in back-up mode, from time to time.

On 15 July 2018, the vessel was probably operated in back-up mode after leaving Longyearbyen en route for Barentsburg.

1.7.4 Service report after the incident

The AIBN has received documentation recording the service that was ordered by the shipping company after the incident. It was discovered that the port pitch was wrongly adjusted after a gearbox overhaul in Norway.

The port drive line appeared to have been adjusted with too much ahead pitch. The consequence of this was that the port engine suffered too much resistance in ordinary combinator mode and was at risk of shutting down.

On Svalbard on 25 July 2018 a service technician from Brunvoll Mar-El AS adjusted the max and min pitch on the port drive line and re-set the engines' output curve on both sides. The constant rpm button was entered as a menu option, while the constant rpm was adjusted from 1370 rpm to 1500 rpm. Certain corrections were also made to the starboard drive line, so that both sides were the same. After this service, both engines and pitch functioned as intended in combinator mode and at constant rpm.

1.8 Operational conditions in the waters around Svalbard

Aurora Explorer was one of several vessels operating in the waters around Svalbard, with daily trips out of Longyearbyen in the summer season 2018.

The passengers were either pre-booked or bought tickets on arrival at the quay. Pre-booked passengers were checked off against a passenger list on arrival. Individual arrivals were recorded by gender, name, date of birth and nationality.

The vessel reported the number of passengers electronically to the shipping company in Tromsø and passed the same information by VHF to the vessel traffic service centre (Nord VTS, Vardø) before departure.

On Svalbard, passenger vessels are not obliged to report their passenger numbers to the local authorities before departure. However, a weekly report on total passenger numbers has to be submitted to the local authorities, so that harbour dues can be calculated. Vessels operating in the 'explorer' market around Svalbard report their arrival in the area and the number of passengers set ashore, if applicable, to Nord VTS.

Aurora Explorer has the automatic identification system AIS² installed on board, as do other established vessels in this market. This does not necessarily apply to every private vessel on Svalbard that takes visitors out.

Voyages to Barentsburg and Pyramiden respectively take place in open, well-charted waters.

Based on conversations between the AIBN and the crew, known accident risks were whale collisions and man overboard. The vessel was equipped with a dinghy and rescue harness for man overboard situations. Collision with a quay had not previously been assessed as a special risk.

VHF radio communications were reported as functioning well while under way to Barentsburg and at the quay there. However, the AIBN was told that there is no VHF contact and very restricted mobile telephone communication alongside the quay at Pyramiden. The vessel was equipped with a short-wave radio and a satellite telephone. However, none of the crew on board, when the AIBN visited, had a GMDSS certificate to operate the short-wave radio. Better VHF and mobile telephone communications at Pyramiden was mentioned as a high priority. The master contended that emergency preparedness would be greatly improved if all passenger vessels in the area were equipped with, and used, AIS.

1.9 The shipping company

1.9.1 General

Arctic Explorer AS was incorporated in Tromsø in 2012. Since its foundation, the company has increased its market share within explorer tourism. The shipping company is

² AIS: AIS is an automatic identification system introduced by the UN maritime organisation IMO in order to increase safety for ships and the environment, and improve regulation and monitoring of shipping. AIS transponders on board ships transmit information about the ship's identity, position, speed and course. This information is captured by the Norwegian Coastal Administration's land-based AIS chain, AIS Norway, which consists of 50 base stations along the coast and by the AIS satellites AISSat-1 and AISSat-2. Source: The Norwegian Coastal Administration

now registered with ownership in the Faroes for *Aurora Explorer* and is in the process of transferring more of its vessels to the Faroese flag. The shipping company has expanded rapidly since 2012, acquiring more vessels and broadening the variety of experiences it offers.

1.9.2 The shipping company's safety management system

When *Aurora Explorer* was transferred to the Faroese flag, Shipping.fo.ApS became responsible for the shipping company's safety management system (ISM). The shipping company's local representative, engaged to look after the safety management system and its documentation (incl. the DOC³), is located in Aalborg, Denmark.

1.10 **Relevant legislation**

After the vessel was de-rated and ceased to be registered as a high-speed craft, it became subject to the Norwegian regulations for passenger vessels. At the time of the accident the vessel was registered in the Faroe Islands. It was therefore subject to Faroese passenger vessel regulations, as well as the IMO requirements for this group of vessels.

The ISM Code is incorporated in Faroese legislation as 'Kunngerð frá Sjóvinnustýrinum um byggikrøv og útgerðarkrøv o.a. í innanoyggja sigling' in Chapter IX. This corresponds with Danish Maritime Authority Notice D 'Technical regulation on the construction and equipment etc. of passenger ships engaged in domestic voyages'.⁴

1.11 **Supervision of shipping company and vessel**

The change of flag state from the NOR register meant that the Faroe Islands, as the new flag state, became responsible for supervising the shipping company and vessel. Italian RINA is the vessel's classification society.

1.12 **Coastal administration and vessel traffic service centres**

There is no local vessel traffic service centre (VTS) or coastal radio station on Svalbard, and vessels call the Norwegian Coastal Administration's vessel traffic service centre/Coastal Radio Nord by VHF link.

1.13 **Measures that have been implemented**

The shipping company has informed the AIBN that it has introduced a procedure on board that requires passengers to be in their seats before and during docking. Signs have also been installed on board.

After the incident, a technician from Brunvoll serviced the Mar-El system and adjusted the pitch on the propeller back to the system supplier's recommendations.

The Norwegian Maritime Authority introduced an immediate precaution, where the buttons for constant rpm on the manoeuvre console are protected by an extra cover to exclude the possibility of error.

³ DOC, Document of Compliance: certifying approval of the safety management system.

⁴ Information received from the maritime authorities on the Faroe Islands.

1.13.1 The shipping company's conclusion after the incident

The shipping company's assessment:

'In collaboration with the ship's classification society and the crew, Shipping.fo has analysed the accident in order to determine the cause and prevent any recurrences. The cause was found to be human error and we have subsequently, in collaboration with the shipping company, changed the set-up of the manoeuvring system so that the error cannot recur. We have also considered whether our procedures for docking should be changed so that all passengers remain seated in their seats until the vessel is tied up alongside the quay, but as there is not considered to be any possibility of a recurrence, this has not been adopted. The captain may of course request all passengers to remain seated and strapped in if that is considered safest.⁵'

⁵ Translated by the AIBN from Danish to Norwegian before translation to English.

2. ANALYSIS

2.1 Introduction

The analysis starts with an assessment of the extent of injury/damage and the rescue work, followed by a discussion of the sequence of events surrounding the vessel's operational mode. Technical matters are then considered, including the measures adopted by the shipping company in relation to operating problems with *Aurora Explorer*. In conclusion, the shipping company's safety management will be discussed, including risk assessment and procedures for nonconformities and servicing.

2.2 Assessment of extent of damage/injuries and rescue work

The extent of damage/injuries from this accident could have been much greater. Many of the 121 passengers, mostly pensioners, were standing out on the open deck as there were a school of whales to watch on the way in. They then had prepared themselves to go ashore across the gangway and many fell during the collision with the quay. Almost one third of the passengers and one crew member were injured, nine of them seriously. It is considered that the extent of the passengers' injuries were greater than if they had been seated in the passenger seats in the saloon when the vessel hit the quay.

Several factors contributed to the outcome being less serious than it might have been:

- There were French-speaking crew, from a cruise ship visiting Longyearbyen, on board *Aurora Explorer* as passengers.
- Another vessel with a practised crew, who spoke the same language as many of the injured, was already at the quay.
- The Russian hospital in Barentsburg was manned and provided full assistance in the initial phase.
- The Governor's helicopter was operational and arrived quickly at the scene. It carried the casualties to Longyearbyen for further treatment.
- An ambulance aircraft was available from the mainland, to transport persons in need of further treatment to Tromsø Hospital.
- The police's incident management functioned effectively.
- A Coastguard vessel was lying alongside the quay in Longyearbyen and was immediately able to despatch personnel in its own RIBs, while the ship itself arrived later to carry the passengers back to Longyearbyen.
- *Aurora Explorer*'s own master had previous ambulance service experience and was able to help with managing the incident.

2.3 Assessment of the sequence of events

The AIBN has received a detailed account of the collision with the quay and subsequent management of the incident. A systematic inspection of the vessel by the Norwegian Maritime Authority and the classification society after the accident excluded a technical fault as the cause of the unwanted acceleration.

2.4 Theory about unexpected acceleration

On arrival, the vessel manoeuvred in towards the quay. Because another vessel was lying there, they came in with a somehow sharper U-turn than normally. When they were relatively parallel with the pier, the master started to apply astern on the port drive line, in order to turn the stern in to starboard. This was normal manoeuvre procedure, in order to attach the first mooring line to land from the stern.

If the portside pitch remained ahead, the rpm would have increased further as long the manoeuvre handle on the port side was pulled astern. This resulting in an unwanted and fast kick ahead forward. Speed on impact with the dock was later estimated to 4-5 knots. If the manoeuvre handle was pulled even harder astern as a possible reaction to the unwanted kick ahead, the speed would have increased even further. The speed increase turned the vessel abruptly to starboard, where it made contact with starboard hull to the pier.

The master confirms that he disengaged both engines after the collision, before re-engaging them in combinator mode to regain control over the vessel. Both drive lines then functioned normally and the vessel was calmly moored to the quay. As no electronic transcript was obtained from the manoeuvring system, a possible oversight whereby the port side was not put back into combinator mode before arrival could not later be traced.

The AIBN considers that the possibility to forget re-engaging to combinator mode before arrival to dock was present as long as the back-up mode was engaged underway. AIBN has not specifically evaluated the design of the manoeuvre system.

The subsequent service by the system supplier did not reveal any other technical/electronic cause for the sudden increase in rpm.

Brunvoll Mar-El AS confirmed to the AIBN that when the manoeuvring system is set to back-up mode and pitch is selected ahead or astern with the joystick, then the manoeuvre handle's only effect, whether it is moved to ahead or astern, will be to increase power (rpm).

2.4.1 Tests carried out on the manoeuvring system

An investigation was carried out after the accident into whether the rate of increase of the port pitch, when set to astern in combinator mode, was the same as the rate at which the manoeuvre handle was moved backwards. Tests did not prove whether or not there was a degree of lag in the system and the technician from Brunvoll Mar-El AS had never experienced such lag in the system either.

A test was also carried out to see whether the rpm changes when the system is set to back-up and the clutches are engaged/disengaged. No change in rpm was experienced. The effect of changing from combinator mode to constant rpm on a drive line was also tested. This was done at low speed when going slowly ahead in combinator mode. The rpm increased, but without the vessel displaying a violent or uncontrollable increase in speed.

2.5 The shipping company's safety management

The crew and general manager made adjustments to the port manoeuvring system to solve the vibration problems experienced with this drive line. As this failed to enable operation of both engines in combinator mode, it was decided to use back-up mode on the port side in order to achieve cruising speed.

The vessel's vibration problems were known before the Svalbard season started. These were partly managed by the shipping company claiming default, and by adopting provisional solutions. The measures were poorly documented.

The service of the manoeuvring system carried out after the accident showed the necessity of using specialised technicians to guarantee optimal adjustment of pitch and power. As the guarantee period for these components had expired, the shipping company was not tied to a particular service supplier. This accident has also revealed that faulty adjustment of pitch and power led to the vessel periodically being operated in an alternative mode, out of necessity. This may have created the possibility of oversight/operational error.

The problem with unwanted vibrations was quickly corrected after the accident, when the supplier's service personnel came on board.

The AIBN's investigation has shown that the shipping company had not assessed the risks to passenger safety that might result from changes in operational mode. The shipping company was unable to produce any assessment of the back-up operational mode that was chosen, with its attendant risk of nonconformity. The technical problems in the form of vibrations were described in a nonconformity report dated 25 June 2018, but neither the shipping company's management nor the SMC Safety Officer/DOC holder in Denmark could later confirm that they knew about it.

The masters discussed between them orally that the vessel was periodically operated with the port drive line in back-up mode. There is no record of a written handover report from master to master.

Based on these findings, the AIBN is therefore submitting a safety recommendation to the shipping company.

3. CONCLUSION

3.1 The sequence of events

- a) The vessel was operated in back-up mode in order to achieve cruising speed under way. This allowed the possibility of operational error/oversight to arise, whereby a master could forget to re-set the system to combinator mode before docking.
- b) On arrival at Barentsburg the vessel was possibly still being operated with the port drive line in back-up mode, so that the propeller on the port side could still have been carrying forward pitch.
- c) The vessel's speed towards the quay increased when the master, following normal practice, pulled the port manoeuvre handle to astern, in order to swing the stern in.

When the manoeuvre handle was pulled to astern, the rpm on the port engine increased, if the system on this side remained in back-up.

- d) The vessel swung uncontrollably to starboard so that it collided with the fenders on the quay.
- e) There would probably have been fewer injuries if all the passengers had been remained seated until docked.
- f) Several factors contributed to the outcome being less serious than it might have been.
- g) First aid, incident management and further treatment of the injured passengers after arrival at Barentsburg were implemented satisfactorily in collaboration with local Russian personnel, other vessels present, the Coastguard and the Governor's personnel.

3.2 Underlying causes

- a) The port pitch was set too high after the previous gearbox overhaul. This led to overload at certain rpm settings, which caused vibrations in the vessel.
- b) During the gearbox overhaul early in 2018, the supplier of the manoeuvring system was not contacted, in order to guarantee that the pitch and load were optimally adjusted.
- c) The service of the manoeuvring system carried out after the accident showed the necessity of using specialised technicians to guarantee optimal adjustment of pitch and throttle.
- d) A prompt and professional correction of the manoeuvring system, once detected that they had a problem, would probably have prevented the accident.
- e) The SMC Safety Officer/DOC holder in Denmark were not aware of the technical problems in the form of vibrations, or that the vessel periodically was operated in back-up mode underway.
- f) The shipping company had assessed neither the risk of nonconformity nor the risk that changes in the operational mode might involve for passenger safety.
- g) The shipping company's requirements about how the vessel was to be operated in back-up mode were not documented.
- h) There was no written handover report between the masters.

4. SAFETY RECOMMENDATIONS

The investigation into this marine accident has revealed one area where the AIBN deems it necessary to make a safety recommendation. Its purpose is to improve safety at sea.⁶

Safety recommendation MARINE No. 2019/01T

Aurora Explorer collided with the quay at Barentsburg on 15 July 2018, and a third of the total of 125 persons on board suffered personal injuries of varying degrees of severity. The vessel was operated in back-up mode in order to achieve cruising speed under way. This allowed the possibility of operational error/oversight to arise, whereby a master could forget to re-set the system to combinator mode before docking. The shipping company has no documentation recording the reasons for this decision, its safe implementation nor an assessment for eventual possible increased risk to passengers due to this.

AIBN recommends Arctic Explorer AS to carry out and document risk assessments for all operational changes in order to ensure the safety of its passengers and crew.

Accident Investigation Board Norway

Lillestrøm, 1 July 2019

⁶ The investigation report is submitted to the Ministry of Trade, Industry and Fisheries, which takes necessary measures to ensure that due consideration is given to the safety recommendations.

DETAILS OF THE VESSEL AND THE ACCIDENT

The vessel	
Name	<i>Aurora Explorer</i>
Flag state	Faroe Islands
Classification society	RINA
IMO Number/Call signal	9196723/OZ2181
Type	Catamaran, combined passengers/mixed cargo
Build year	1999
Owner	Shipping.fo Faroe Islands
Operator / Responsible for ISM	Shipping.fo ApS, Aalborg, Dk.
Construction material	Aluminium
Length	23.980 m
Gross tonnage	177 t
Safety crew	4
The voyage	
Port of departure	Longyearbyen, Svalbard
Port of arrival	Barentsburg, Svalbard
Type of voyage	Inshore
Load	Passengers in tourist traffic
Persons on board	121 passengers, 4 crew
Information about the accident	
Date and time	15 July 2018
Type of accident	Collision with quay
Place/position where the accident occurred	Barentsburg
Place on board where the accident occurred	Open deck and interior
Injured persons	36 passengers and one crew member suffered varying degrees of injury
Damage to vessel/the environment	Minor hull damage to starboard bow/hull, no emissions to sea.
Vessel operation	Manoeuvring to quay Barentsburg
Where was the vessel on its voyage	On arrival at destination
The external environment	Fine, good visibility, measured temperature 5.5 °C, moderate breeze 6 m/s NNE