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Accident
Investigation Board
Norway

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REPORT ON MARINE ACCIDENT – RIB, FALL OVER BOARD IN OLDEN 22 JULY 2015

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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

The Accident Investigation Board Norway (AIBN) was notified on Wednesday 22 July 2015 at 14:40 that an accident with a RIB (Rigid-Inflatable Boat) had occurred in Olden, Sogn og Fjordane, earlier that day. Three persons, including the skipper, had fallen overboard. Two persons were physically unharmed, while the skipper was pulled lifeless from the water and resuscitation was attempted. The following day the skipper was declared dead.

The AIBN decided to carry out a safety investigation of the accident and travelled to Olden on 27 July 2015 in order to examine the vessel, conduct interviews and gather available information.

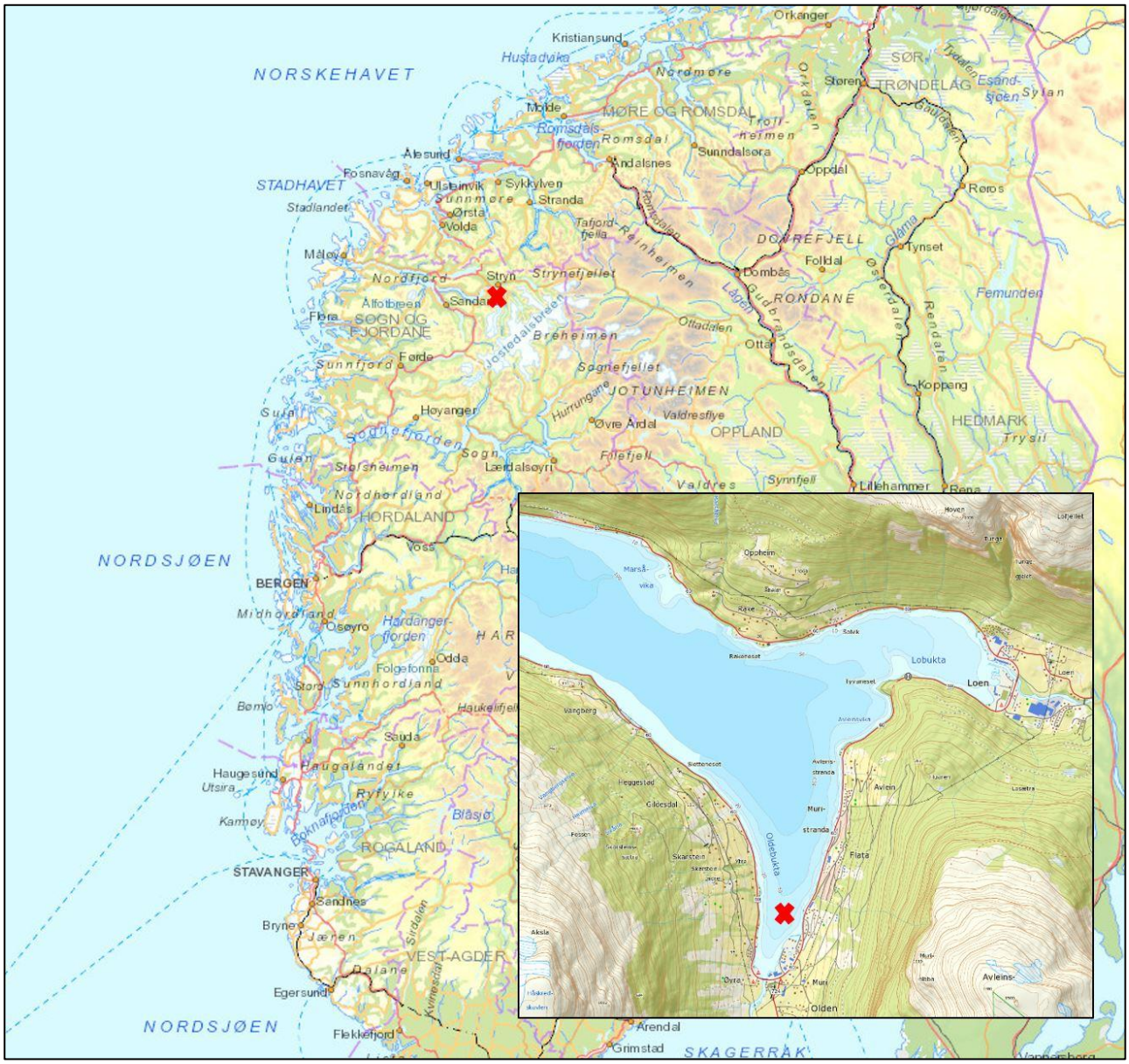

Figure 1: The accident location. Map: The Norwegian Coastal Administration

SUMMARY

On Wednesday 22 July 2015 an accident occurred with a charter RIB in Olden in Sogn og Fjordane County. Nine passengers from a visiting cruise ship were out on a RIB trip operated by a local tour operator. No safety briefing had been given to the passengers prior to departure. As the skipper was making a turn to port, the stern of the RIB hooked in the waves created by a tender, and three people, including the skipper, fell into the water. The passengers were not prepared for the sudden, sharp movement and the boat was not fitted with suitable handholds in all positions for them to hold on to.

The skipper had not attached the «kill cord» to his body and the RIB continued to move away from the people in the water until one of the passengers succeeded in stopping it. The skipper was dressed in a lined boiler suit with the zip open at the front. He soon experienced difficulties staying afloat, lost consciousness and died as a result of drowning.

The tour operator's safety management system was inadequate in some areas and could have been better implemented. A well-adapted and better implemented safety management system could have contributed to ensuring the safety of those on board. The AIBN recommends that the tour operator review its safety management system and implement sound safety procedures.

The company had operated RIB trips since 2008, without the Norwegian Maritime Authority (NMA) ever having inspected the company prior to the accident. A number of requirements are imposed on the tour operator by the Norwegian Regulations on the operation of small passenger craft. However, there are no requirements for approval or inspection in order to be able to start up or run such a company. An inspection could have uncovered deficiencies in the vessel and equipment, as well as weaknesses in the safety management system. Furthermore, no overview exists of this group of vessels or the companies involved, which is a prerequisite for exercising purposeful and effective supervision.

The AIBN recommends that the NMA should obtain an overview of the whole group of vessels, implement measures to control that the operators are operating in accordance with applicable regulations.

The skipper's medical condition had changed during the period since his previous medical certificate was issued and the seafarers' doctor and the tour operator had not been notified of this. If the skipper had attended a medical examination on the day before the accident the conclusion would have been 'temporarily unfit pending final clarification'. It cannot be excluded that the skipper's state of health and medication contributed to him having reduced capability to understand and assess the situation, make good decisions and manoeuvre the vessel safely.

The seafarers' doctor was not fully informed about the skipper's state of health and medication despite both his general practitioner (GP) and specialist having information about these matters. The Health Personnel Act does not permit medical personnel to notify the seafarers' doctor that a seafarer does not meet the required health standard. The AIBN believes that the Health Personnel Act should be amended so that seafarers are also covered by the duty of notification.

The AIBN submits a total of four safety recommendations as a result of this investigation.

1. FACTUAL INFORMATION

The information has been gathered through interviews with the vessel's passengers, witnesses, employees of the RIB company, inspection of the vessel and documentation from the tour operator Briksdal Adventure AS and the cruise ships *Britannia* and *Seabourn Quest*. Information was also obtained from the supplier and the Norwegian importer of the RIB vessel, the NMA, the police, the Department of Forensic Medicine at the University of Bergen, the skipper's GP, the seafarer's doctor and the specialist.

The AIBN has also obtained photos and video recordings from witnesses, as well as CCTV recordings from the cruise ships. One of many important sources for understanding the sequence of events is a video recording of the accident, made by a passenger on board the cruise ship *Britannia*. In addition to this report the AIBN has produced an animation that illustrates parts of the event and highlights important safety issues. The Animation can be found on the AIBN web-site.

1.1 Sequence of events

1.1.1 Prior to departure

At the time of the accident two cruise ships were lying in Olden. *MV Britannia* lay with her starboard side against the quay, while *MV Seabourn Quest* was lying at anchor about 300 m off shore. RIBs operated by Briksdal Adventure were tied up alongside, and departed from, a floating pier right next to the quay (see the figure below). Seabourn Quest's tenders came alongside the same floating pier in order to land and pick up their passengers.

Figure 2: The positions of the cruise ships in Olden on the day of the accident. Map: The Norwegian Mapping Authority. Illustration: AIBN

One of Briksdal Adventure's RIBs had been booked in advance by the visiting cruise ships for three trips before lunch and two trips after lunch. The same skipper was due to take all the trips.

The tour operator sold an additional nine tickets for an extra RIB trip, at 13:00 on the same day, to passengers from the cruise ship *Britannia*.

Shortly before 13:00 the passengers were each equipped with an immersion suit, protective goggles and gloves. The skipper with an assistant handed out the equipment and helped the passengers to put it on. The skipper was dressed in a lined boiler suit without flotation elements, with the zip open down to his waist.

At 13:00 a change of watch was carried out on *Britannia*'s bridge and the crew members assembled around the centre console.

1.1.2 The accident

The RIB left the floating pier aft of *Britannia* just after 13:00 and went at moderate speed round two mooring buoys that were being used by the cruise ship. The skipper was standing on the port side by the steering console, whist all the passengers were sitting in their respective seats, see Figure 9. Just before departure the skipper had remarked to the passengers that if they were to experience any waves that day, they would have to make them themselves.

Figure 3: The RIB rounds the stern of the cruise ship just before the accident happened. Photo: Mr. Alan Jackson

When they were clear of the mooring lines the skipper increased speed. When they were abeam the cruise ship's stern the skipper probably applied full throttle and the boat presumably reached 25-30 knots in a short time (see point A in Figure 4). The skipper had started the previous trip in the same way and had then proceeded to execute a turn between the two cruise ships lying in the fjord.

A tender that had recently left the quay in Olden and returned to *Seabourn Quest* had left some stern waves in the area towards which the RIB was heading. The wave height is estimated to have been around 0.5 m.

The RIB caught up with the waves made by the tender and drove into them (point B) before the skipper commenced a sharp turn to port. The boat then turned to port into the wave pattern roughly parallel with the waves (point C). Half-way through the turn the stern of the RIB skidded over a wave top, before abruptly regaining its grip on the water (point D). The boat, which was heeling sharply inwards in the turn, suddenly jerked upright as the stern regained its grip on the water and the skidding motion stopped abruptly. It was at this point that first one passenger, then the skipper and finally a second passenger fell into the sea on the starboard side of the boat. A skid like this that stops abruptly is a phenomenon known as a 'hook'. The accident occurred at 13:03.

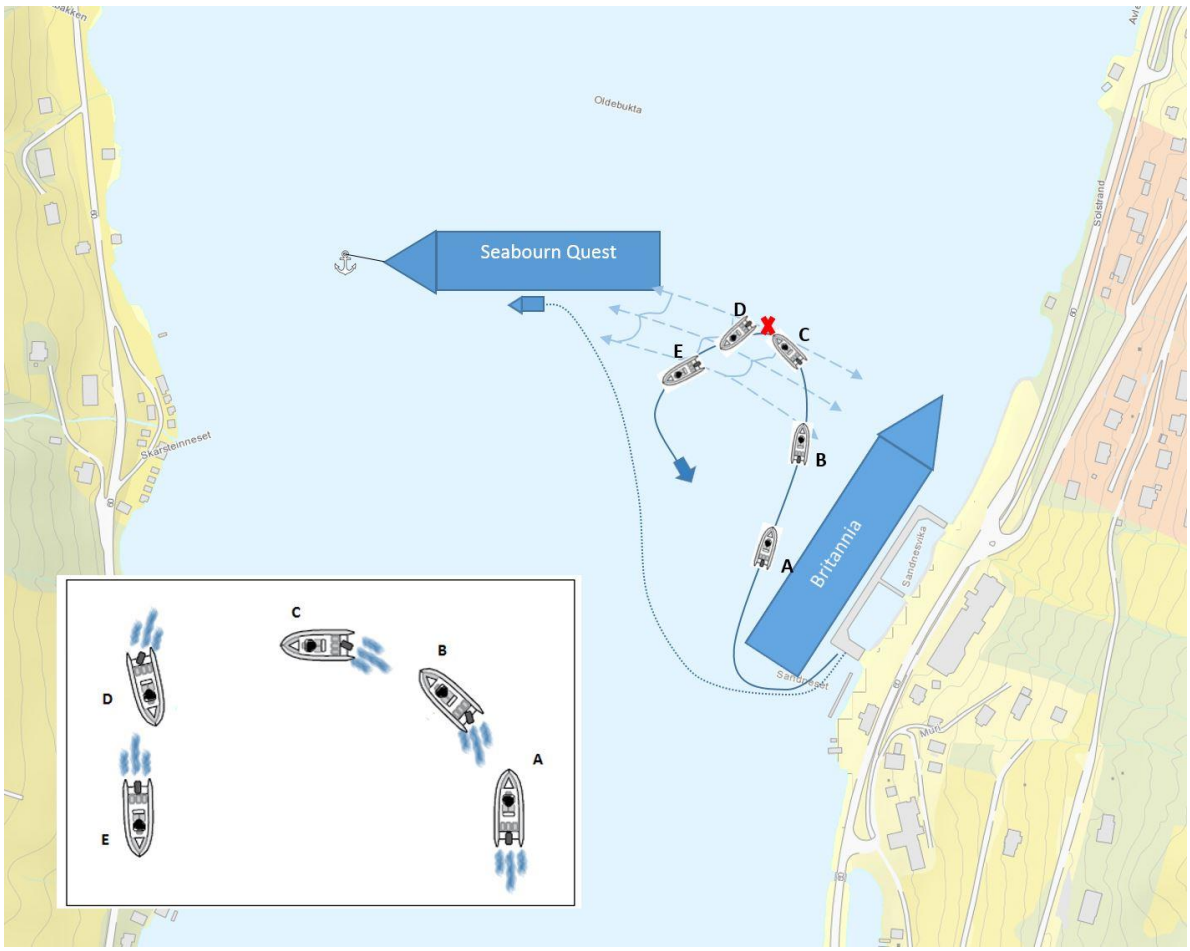

Figure 4: A turn to port where the stern of the vessel loses its grip and skids, before the boat regains its grip on the water. Map: The Norwegian Mapping Authority. Illustration: AIBN

With no one at the helm, the boat was still moving at high speed and it continued at high speed through the port turn that the skipper had started. After some seconds, the person who was sitting just behind the driver's seat pulled out the «kill cord», so that the boat came to a halt about 150-200 m from the people in the sea.

Figure 5: The photo was taken from a cabin on board 'Britannia' just after the accident. The circle marks the position of the three people in the water. Photo: Mr Hinnerk Hatecke

1.1.3 Notification of the accident

When the RIB was lying still, a good distance from the people in the water, those on board tried to alert the surrounding vessels of the emergency situation in which they found themselves. They waved and shouted at the cruise ships. Approximately five minutes after the accident occurred the passengers in the RIB tried to use the vessel's radio communication equipment (VHF) to alert. None of them were familiar with this type of equipment, but they managed nonetheless to make an emergency call.

The skipper of the RIB shouted and made signs to the other two that they must swim to shore. The passenger who fell into the water first, started to swim and managed to save himself, reaching the shore after around eight minutes. The other passenger swam in the direction of the skipper to get closer to the shore.

On board *Seabourn Quest* the crew on the bridge became aware that there were people in the water as early as about one minute after the incident. They did not realise that that the skipper of the RIB was among them and they therefore assumed that the skipper would be able to rescue his own passengers. After about five minutes they understood that the skipper was in the water and that there was a need for assistance. They immediately ordered the tender to help, as soon as all the passengers were re-embarked. Just after this an order was given for the rescue craft to be manned and made ready for launching.

Seabourn Quest's tender was the first vessel to arrive at the scene of the accident, all of seven minutes after the event.

On board *Britannia* several passengers had witnessed the incident and the reception was notified about three minutes after the incident had occurred. The reception immediately passed the message on to the bridge. The crew on the bridge were unsure whether help was required and called the captain. Just before the captain arrived, could the emergency call be heard from the RIB over the VHF. When the captain came on the bridge and saw that the boat driver was about to drown he immediately ordered the rescue craft to be manned and launched.

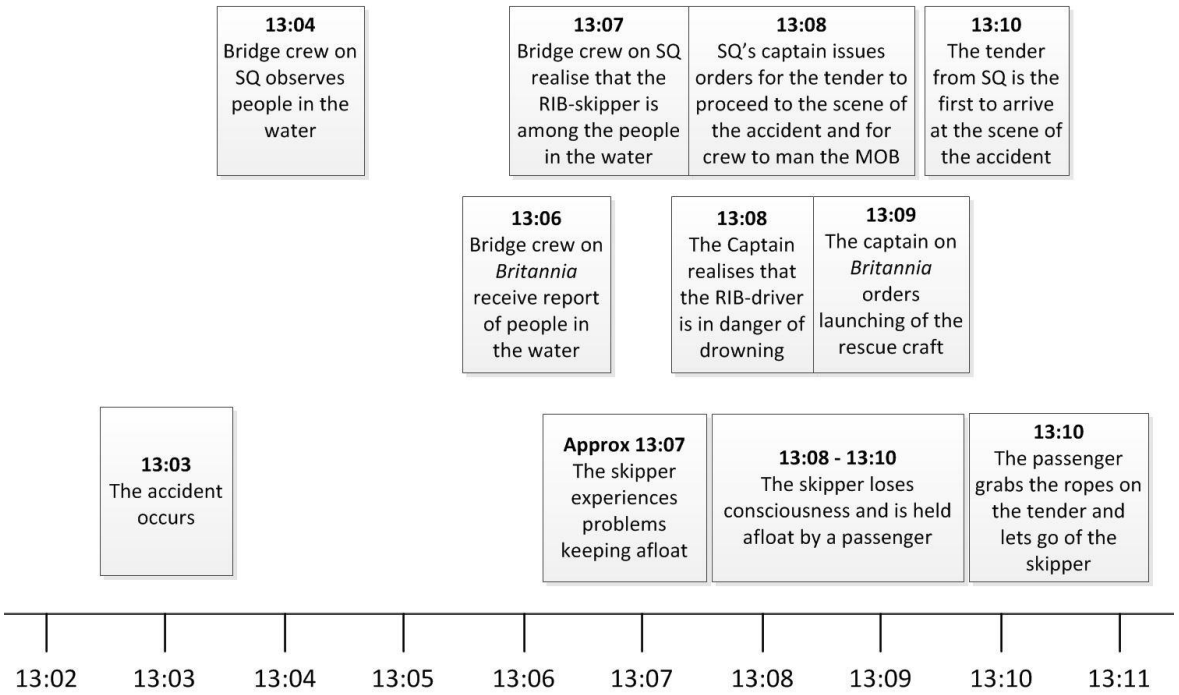

Figure 6: The time line illustrates when the bridge crews on 'Seabourn Quest' (SQ) and 'Britannia' became aware of the incident and their subsequent actions. Illustration: AIBN

At the same time, the tour operator's general manager was alerted about people in the water from a person working on the pier. He ran immediately together with an employee to their other RIB and set out towards the scene of the accident.

1.1.4 The rescue operation

In the meantime it became clear that the skipper of the RIB was having problems staying afloat and was about to lose consciousness. The other passenger therefore swam over to him and tried to help. The passenger tried to keep the skipper afloat and conscious, but did not succeed. The skipper was so heavy that the passenger did not manage to keep them both above the surface of the water.

Seabourn Quest's tender was the first vessel to arrive at the scene of the accident, seven minutes after the event. The passenger who was holding the skipper grabbed the ropes on the tender boat and then received help from a member of crew in the tender. The passenger did not manage to hold on to the RIB skipper any longer and the skipper began to sink.

At around the same time *Britannia*'s rescue craft was lowered. It was decided to launch it as soon as possible and therefore manned with only two out of the normal crew of three. The rescue craft drove quickly towards the scene of the accident and arrived just after the RIB from Briksdal Adventure.

The tour operator's general manager dived into the water to try rescue the skipper. At the third attempt he succeeded in taking hold of the skipper and bringing him up, around two minutes after he sank. He hung on to the tender, holding tightly onto the skipper at the same time, until the rescue craft from *Britannia* arrived and took charge of the skipper. The general manager of the operating company was helped on board the tender.

The crew of *Britannia*'s rescue craft tried to pull the skipper out of the water using a rescue net. At first they had problems with placing him horizontally and across the net. When they finally placed the skipper in the right position it became clear that they had let go of the end of the net, so that it was not possible to haul him in. One of the crew then jumped into the sea and retrieved the end of the net so that his colleague could haul the RIB skipper on board. However it appeared that the underside of the net was not attached to the boat so that the net disappeared into the sea again and the skipper fell back into the water. They then spent one minute attempting to rig the net correctly and get the skipper back into place.

The passenger who was still in the water let go of the tender and swam over to the other RIB and held onto it. Just afterwards, the tender moved over to the RIB and the tour operator's general manager transferred to the RIB. The general manager and his colleague managed to help the passenger up out of the water and on board the RIB, before they manoeuvred over to *Britannia*'s rescue craft and crossed over into it. Together with the crews on the rescue craft and the tender they finally succeeded in hauling the skipper on board around five minutes after he had been brought up to the surface. Resuscitation attempts were started immediately.

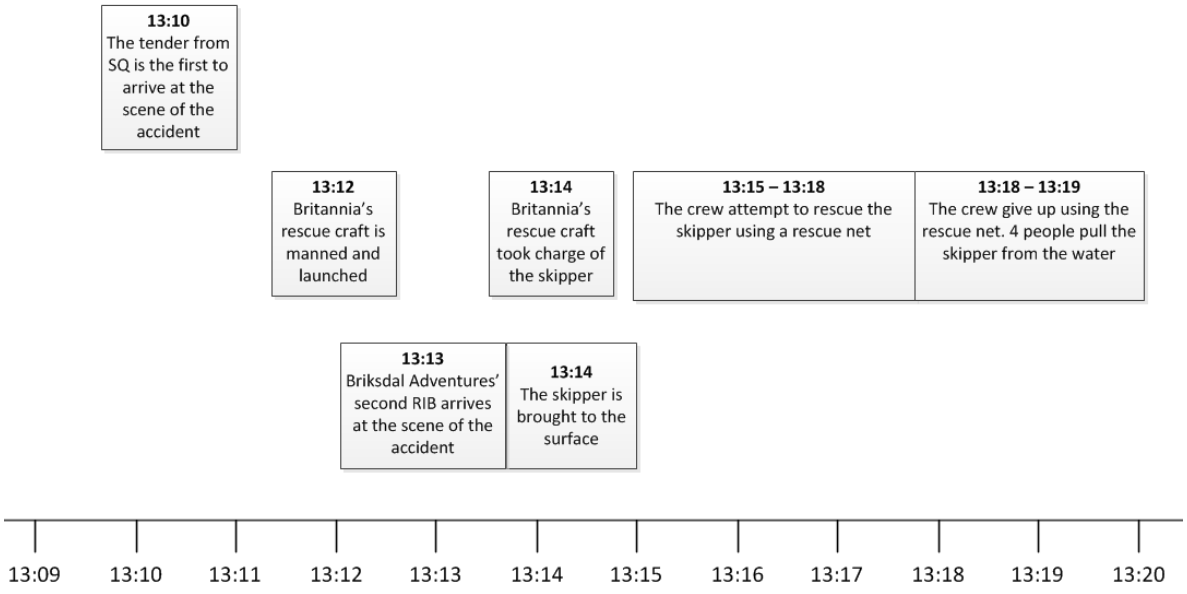

Figure 7: The time line illustrates relevant events during the rescue operation. Illustration: AIBN

1.2 Extent of injuries

The skipper of the RIB was quickly transferred to *Britannia* and taken care of by medical personnel, before being flown to hospital in an unconscious state. He was declared dead the following day.

All the passengers stated that they had experienced a violent and unexpected movement that subjected them to powerful sideways forces. The passenger who was sitting aft on the starboard side experienced his upper body being thrown out across the pontoon and then back into his seat. The passenger who was sitting in the middle seat at the stern explained that she received a powerful blow in the chest, without being able to say with certainty what had happened.

The passenger who was sitting forward on the starboard side experienced that he came very close to falling overboard. He suffered a large bruise on the inside of his left leg, which was crushed hard against the handhold hoop, while his right foot was jammed between the deck and the pontoon. This person had clung on to the handhold in order not to fall overboard.

The first of the passengers who fell into the water had been holding on to his own seat back with his right hand. He had considerable pain in his right shoulder after the accident and this later was medically confirmed as a shoulder injury. The two passengers who fell into the water said that they were very cold and physically and mentally exhausted after the incident.

1.3 Water, weather and sea conditions

On the day of the accident it was cloudy with a light drizzle in the air, a light breeze and no waves. The water in the fjord was around 14 °C on the surface and 11 °C at eight metres' depth.

1.4 The vessel

The vessel was a rigid-inflatable boat, or RIB, produced in South Africa by RIBEYE LTD, which has its head office in Dartmouth in the UK. The boat involved in this accident was a RIBEYE 785, built in October 2007 and approved for 14 persons in total. The boat has a conventional fibreglass hull with inflatable pontoons around the hull and was CE marked according to the Recreational Craft Directive (94/25/EC).

The AIBN inspected the vessel after the accident and was taken out on a trip corresponding to what Briksdal Adventure offers its customers. In addition, an independent expert on this type of vessel has assisted with analysis of the video and photographic material relating to the accident. Based on this information it was commented that the boat's bow appeared to be lying somewhat low in the water, which may have affected its handling characteristics.

1.4.1 The boat's seating configuration

The user manual for the boat type gives possible seating configurations as shown in the picture below.

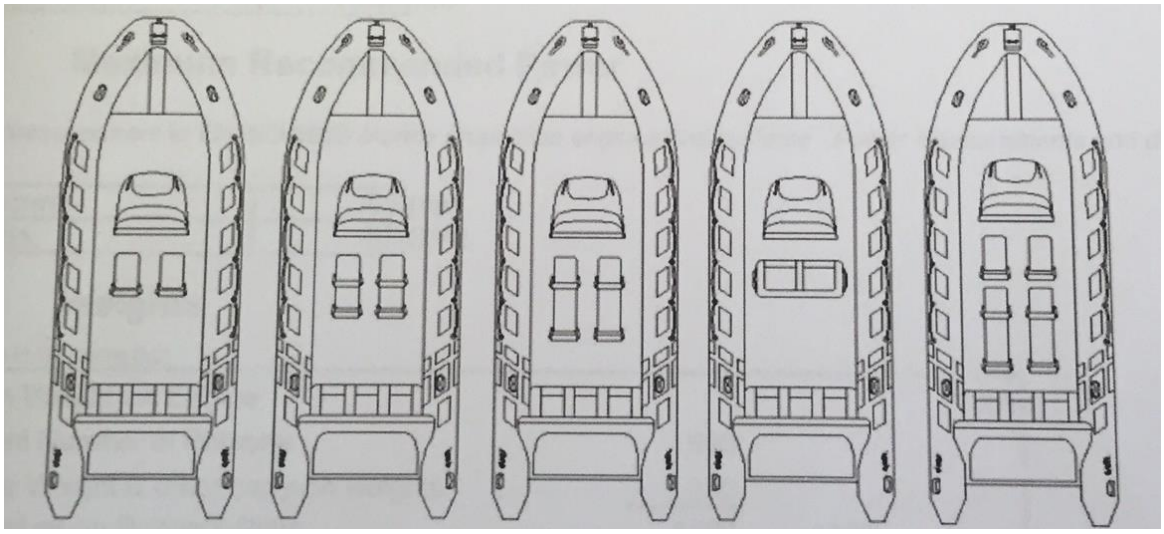

Figure 8: Seating configuration taken from the user manual that comes with the boat. Source: Ribeye Ltd.

The Norwegian importer bought quite a large number of boats of the RIBEYE 785 type, which were sold on to boat dealers in Norway. The importer estimates that around 30 boats of this type were imported, which were all delivered in flat-pack form. The importer explains that no assembly instructions accompanied the boats, but that he assisted the boat dealers with fitting out the boats according to the buyers' wishes and needs.

The seating configuration of the boat in question did not correspond with any of the examples in the user manual. It had four saddle seats ahead of the skipper's position and four saddle seats behind the centre console (steering position), with a further three seats in a bench configuration at the stern of the vessel, see figure below.

Figure 9: The RIB's seating configuration. The red circles mark where the passengers were sitting and the red crosses mark the passengers who fell into the water. Photo: AIBN

1.4.2 Facilities for holding on

As shown in Figure 9, the two foremost seats have a hoop-shaped handhold in front. On the seats behind these, immediately in front of the steering console, it is possible to hold on to the back of the seat in front.

The boat's helmsman can hold on to the steering wheel and the throttle lever. No obvious handhold is provided for the passenger to starboard of the helmsman. The hoop on the side of the steering console is out of normal reach for a person sitting in this seat. Alternatively, the passenger can hold on to the back of his own seat. Passengers on the aft most saddle seats can hold on to the back of the seat in front.

At the stern there is group of seats for three persons. There is a handhold on top of the pontoon on both sides, but none for the person sitting in the middle.

Several passengers said that they had clung on to their handholds so as not to be thrown overboard when the accident happened. The two who ended up in the water have both said that they were unable to hold on and that they thought the handholds were unsuitable.

1.5 The boat's skipper

The skipper of the RIB had extensive maritime experience and had been permanently employed as captain on offshore vessels since 1999. He therefore met the minimum requirement for operating a recreational craft of holding a Deck Officer Class 5 (D5L) certificate or a Master Fishermen Class C certificate, see section 1.8.1.

The skipper was a friend of the general manager of Briksdal Adventure and was asked to take some RIB trips for the company during his free periods. The AIBN has been informed that the skipper had driven some trips for the company in 2015 and had previously helmed a RIB together with the general manager in his leisure time. The AIBN has no further information about the extent of the skipper's previous RIB-driving experience, or what skills he possessed.

1.6 The tour operator

1.6.1 General

Briksdal Adventure AS is based in Olden, at the inner end of Nordfjord in Sogn og Fjordane. The company offers activities and adventure trips in the local area, and serve food in own premises on the quayside in Olden. One of the activities it offers is a 45-minute RIB trip on the fjord where, according to the tour operator's website, the passengers experience an exciting boating adventure combined with sightseeing. The company has two RIBs that are normally in operation from May to October. They also offer hiking tours, glacier safaris, kayak trips, team building activities and bicycle hire. The company is owned by the general manager and his son and has run RIB trips since 2008.

The activity is seasonal, with especially high activity levels in the summer as a result of cruise ship visits. The cruise ship passengers can pre-order activities from on board the cruise ship, or buy tickets for planned activities from the company's premises on the quayside.

1.6.2 The tour operator's safety management system and practice

The Regulations of 24 November 2009 No 1400 relating to the operation of craft that carry 12 or fewer passengers etc. ('Regulations on the operation of small passenger craft') apply to inter alia RIB craft used commercially. The regulations include a requirement for a documented safety management system to be established.

Briksdal Adventure AS had established a safety management system for operating the RIBs. The safety management system was documented and a paper copy was kept in a folder in the company's premises.

The AIBN has been informed that all employees were asked to familiarise themselves with the system and that they all knew where the documents were to be found. The general manger informs that he has gone through the safety management system with the deceased, but the company did not have any routines for documenting the familiarisation.

A description of the relevant sections in the company's safety management system follows:

1.6.2.1 *Use of buoyancy aids*

Given the RIB's speed and other rescue equipment the Regulations on the operation of small passenger craft require that everybody on board shall wear an immersion suit which on its own, or in combination with another buoyancy aid, provides a buoyancy of at least 150 N and Class D thermal protection. This was also pointed out in the company's safety management system.

Immersion suits were handed out to all the passengers before embarking. The suits were of two different types. One type had satisfactory thermal protection, and 54-111 N buoyancy (depending on size). The other had 50 N independent of size and unspecific thermal protection.

During the trip on which the accident occurred the skipper was not wearing buoyancy clothing, but only a boiler suit with an open zip at the front.

1.6.2.2 *Safety briefing*

The Regulations on the operation of small passenger craft require that the passengers shall be given a safety briefing, adapted to the purpose of the trip, immediately before departure. The briefing shall include information about the use of rescue and safety equipment and what actions the passengers should take in an emergency.

On this point the company's safety management system mainly replicated the requirements and content of the regulations. The system provided no guidance on how the safety briefing should be carried out in practice, or what specific information should be given. The general manager informs however that the boat driver had been on two previous tours where the general manager held a safety briefing to passengers.

The passengers who took part in the trip on which the accident occurred have reported that they were not given any safety briefing.

1.6.2.3 *«Kill cord»*

The Regulations on the operation of small passenger craft do not mention use of a «kill cord». Nonetheless, the company's safety management system indicated that 'The skipper shall use the «kill cord»'.

On the trip on which the accident took place the «kill cord» was not attached to the skipper.

1.6.3 Deficiencies found during the NMA's inspection after the accident

The NMA had not previously conducted any supervision of Briksdal Adventure AS when the accident occurred, but carried out an inspection after the accident. The inspection found deficiencies in the buoyancy aids, as mentioned above. Some of the other deficiencies are also mentioned in this report, as they can contribute to the overall picture of the company's safety management system at the time of the accident.

The Regulations on the operation of small passenger craft include requirements for a fitted compass, up-to-date charts, parachute flares, hand flares, safety certificate for the radio and an installation certificate for the electrical system. The company's management system reflected these requirements, but deficiencies were nonetheless found during the NMA's inspection.

There are also specific regulatory requirements for medical equipment. Under this heading the company's management system stated *'There must be first aid equipment, 1 x orange case, on board"*. The NMA found that the contents were very inadequate and that end-dated products had expired five years ago.

1.7 The Norwegian Maritime Authority's supervision

1.7.1 General comments about the NMA's supervision of the RIB industry

In autumn 2011, the NMA conducted a survey of companies operating small passenger craft. These companies mainly operated as RIB trip providers. The survey showed that, of 17 companies, only 5 fully or to a large extend satisfied the requirements, two met the requirements in some areas and 10 did not satisfy any of the regulatory requirements. Against this background the NMA gave notice, in a press release dated 11 May 2012, of supervisory activities and unannounced inspections.

As a consequence of the accident with the taxi boat Isabella in Kragerø on 27 July 2013 (Report Marine 2014/08) a checklist was prepared in 2014 for unannounced inspections pursuant to the Regulations on the operation of small passenger craft. In recent years, the NMA has had a summer campaign where the regions have focused on taxi boats and RIBs. On Svalbard, the NMA has stationed a permanent inspector from week 22 to week 33, whose tasks include unannounced inspections of vessels carrying up to 12 passengers. A number of unannounced inspections also take place as a result of reports of concern from customers or industry players.

The NMA carried out a total of 21 such unannounced inspections in 2015 and recorded issuing 54 safety deficiencies to the companies concerned. Of these 54 deficiencies, 45 required rectification before embarking on another trip. In 2016 (as of 7 September 2016), 31 such inspections were conducted, resulting in 31 deficiencies, of which 16

required rectification before embarking on another trip. These inspections were directed at the whole group of craft covered by the Regulations on the operation of small passenger craft. The NMA cannot easily sort out information about which or how many of these craft were RIBs. As there is no registration requirement for these craft, the supervisory authorities also lack an overview of which and how many craft and companies fall under the scope of the regulations.

1.7.2 The NMA's inspection of Briksdal Adventure AS after the accident

The NMA carried out an inspection of the tour operator the day after the accident. The checklist for unannounced inspections pursuant to the Regulations on the operation of small passenger craft was not used on that occasion. The inspector who conducted the inspection stated that the inspection office to which he belongs did not know that the checklist existed. The result of the inspection was therefore reported in a Word document, where all findings were listed as 'Deficiencies'. Checklists, safety deficiencies and nonconformities shall normally be reported in an inspection system that enables traceability, follow-up and closing.

The NMA has stated that they gave verbal instructions prohibiting operation of the craft until the deficiencies were rectified. There was no expectation of feedback from the operator, confirming that the deficiencies had been rectified. The operator did not understand that operation had been prohibited and the company continued to operate the vessel as usual. The operator expected the NMA to follow up the inspection and, in spring 2016, he therefore contacted the NMA himself, as he had not heard anything. The same inspector carried out a new inspection on 18 May 2016, where it was verified that all deficiencies had been rectified. No report or documentation was produced confirming this.

1.8 Relevant Norwegian, Danish and Swedish regulations

The AIBN has collected information about Danish and Swedish regulations relating to the operation of small passenger craft in order to compare them with the Norwegian requirements.

1.8.1 Norwegian regulations

The Regulations on the operation of small passenger craft apply to inter alia RIBs that are used commercially and carry passengers other than the crew. The regulations instruct the operator to carry out an annual self-inspection, using a form established by the NMA, which the NMA can request presentation of at any time. No requirements are imposed for registration, a permit for the carriage of passengers or inspection.

Prior to the issuance of these regulations craft carrying up to 12 passengers were required to undergo initial and annual inspections to be issued with a permit for limited carriage of passengers. This provision did not at that time apply to RIB vessels.

The first draft of the Regulations on the operation of small passenger craft included a proposal that such craft should be registered in the Norwegian Ship Register (NOR) and that the craft's condition and operation should be reported annually to the NMA. The proposals were not included in the final text of the regulations.

There is also a requirement for the skipper to have an appropriate certificate for the size of craft (minimum Deck Officer Class D5L, or Master Fisherman Class C), a medical certificate for employees on ships and basic safety training pursuant to the Regulations concerning qualification requirements.

1.8.2 Danish regulations

The Danish regulations relating to small craft that carry up to 12 passengers apply to vessels below 15 m in length and having a dimensional value (LxB) of less than 100. Vessels with a dimensional value above 20, or propulsion power output exceeding 100 kW, must be registered and undergo initial inspection by the Danish Maritime Authority (DMA) before being taken into use. After that, there are requirements for inspection every second year and intermediate inspections. The latter are carried out as operator inspections documented by submission of safety instructions and a declaration. On completion of initial inspection and subsequent renewal inspections, the DMA issues a permit to sail with passengers (*Tilladelse til sejlads med passagerer*) valid for a maximum period of 48 months.

The Danish regulations require the establishment of a documented safety management system. The regulations also contain guidelines for preparing safety instructions.

There are also minimum requirements for the skipper to hold a Certificate of Competency (*sønæringsbevis*) and a certificate of proficiency at sea that applies to merchant ships (*dugelihedsbevis i sejlads for handelskibe*). The certificate of competency may be substituted, if other criteria related to theory, experience and practical tests are satisfied. The skipper is also required to have a valid medical certificate.

On its website, the DMA has a list of approved RIB companies. The permit and safety instructions are required to be displayed on board. The permit must show where the boat is permitted to sail and whether there are other conditions that apply to its operation at sea. The safety instructions must explain how the company works to ensure safety.

1.8.3 Swedish regulations

Craft that are to be used commercially must be registered in the Swedish Register of Ships if the maximum length is five metres or more, but there are no inspection requirements for vessels of less than 20 gross tonnes. The operator is responsible for ensuring that the applicable rules are complied with.

For craft that can operate at speeds exceeding 35 knots, a special 40-hour course and a certificate for high-speed craft (*snabba fartyg*) are required, in addition to certified competency as a skipper (ships' officer class 8 certificate – *fartygsbefälsexamen klasse 8*, or a skipper's certificate – *skepparexamen*). The skipper is also required to have a valid medical certificate.

1.9 The seafarers' doctor scheme

The purpose of the seafarers' doctor scheme is to ensure that the employees are medically fit for service and do not constitute a danger to others or to safe operations[1]. The Regulations of 5 June 2014 No 805 on medical examination of employees on Norwegian

[1] See https://www.sjofartsdir.no/sjofolk/sjomannsleger/ (read 2 August 2016).

ships and mobile offshore units (Regulations on medical examination of employees on ships) require employees who are to serve on board to have a valid medical certificate. As a general rule, the regulations apply to those who work on board Norwegian ships or mobile offshore units and seafarers' doctors who carry out medical examinations and issue medical certificates under the regulations. Examination forms have been prepared, which the seafarers' doctors are required to use for the medical examination. There are also requirements for a quality system for the seafarer's doctors.

In principle, the medical certificate is valid for two years before it must be renewed; see Section 5. Section 6 requires a new medical certificate, if it is probable that the employee no longer meets the regulatory standard of health. The shipping company, or the captain of the ship, shall request an updated medical certificate and the employee is required without undue delay to inform the captain or the company and consult a seafarer's doctor.

The Act of 6 July 1999 No 64 relating to health personnel etc. (the Health Personnel Act) does not permit medical staff to inform the seafarer's doctor that a seafarer no longer satisfies the medical requirements, however. Section 34 of the Health Personnel Act only imposes a duty of notification on medical staff for patients with driving licences for motor vehicles, or pilot's licences. Persons undergoing such a medical examination must sign a special declaration of consent, so that the seafarer's doctor can obtain information from the GP, specialist etc.; cf. the Health Personnel Act, Section 22.

The AIBN has been informed that the NMA has previously applied to the Norwegian Directorate of Health to have a reporting duty that covers seafarers included in Section 34 of the Health Personnel Act. The Ministry of Health and Care Services ('HOD') has now started work on considering amendments to Section 34 of the Health Personnel Act. In that connection the Ministry of Trade, Industry and Fisheries (in a letter dated 18 February 2016) has asked HOD to include a proposal that employees on ships, who are required to have medical certificates, should be covered by the duty of notification in Section 34.

1.10 Medical considerations

1.10.1 Survival capability in water

There are numerous factors that affect survival capability in water. Among the most important are water temperature, clothing, and use of flotation equipment, state of health and time in the water.

BUOYANCY CLOTHING AND FLOATING POSITION HAVE AN IMPACT ON SURVIVAL TIME IN WATER AT DIFFERENT TEMPERATURES, AS SHOWN IN THE TABLE BELOW			
Watertemperature	**APPROX. 5 °C**	**APPROX. 10 °C**	**APPROX. 15 °C**
WITHOUT A LIFE JACKET			
Floating with the head occationally dipping below the surface	0,75	1	1,5
Treading in the water to keep the head above water	1	1,5	2
WITH A LIFE JACKET			
Swimming	1	1,5	2
Lying still with outstreched legs	1,5	2	3
Lie in foetal position / Buddy position	2	3	4

Figure 10: Survival time and water temperature. Source: NMA

The table has been obtained from the NMA's booklet for users of recreational craft No 1 *Mennesket og vannet* ('Man and water') dated November 2005. Translated by AIBN.

1.10.2 Skipper's health

The forensic examination of the skipper concluded that the cause of death was assumed to be drowning.

The AIBN has obtained the following supplementary information about the RIB skipper's health: GP's patient record, patient record from Førde Hospital and documentation from the seafarer's doctor (patient record, medical certificates and examination form).

Oslo University Hospital has assisted the AIBN by reviewing and assessing the medical information. It appears that the skipper had illnesses/physical conditions for which he took medication. These may have affected his physical skills and cognitive functioning at the time of the accident. There is also a certain possibility that his state of health may have contributed to him being unable to keep his head above water and remain conscious.

The Norwegian Centre for Maritime Medicine (NSMM) at Haukeland University Hospital has assisted the AIBN with further investigation of the skipper's state of health, compared with the Regulations on medical examination of employees on ships. The investigation has shown that:

- The skipper had a valid medical certificate, issued on 11 November 2014 and valid until 11 November 2016. According to the NSMM, the seafarer's medical examinations and decisions were in conformity with the Regulations on medical examination of employees on ships.

- According to the report that the AIBN has received from the NSMM, there must nonetheless have been one or more shortcomings during the seafarers' medical examination on 11 November 2014. This is because the self-declaration by the skipper was not correctly completed as regards his state of health at the time in question. The NSMM has also found shortcomings in the doctor's documentation, clinical examinations and opinion. According to the NSMM it appears that the decision made by the seafarer's doctor was nonetheless correct.

- The documentation shows that after November 2014, and through the spring of 2015 up until the accident occurred, there were several medical circumstances that might give reason to suppose that the skipper no longer met the regulatory health requirements. The AIBN has no information about whether the skipper consulted the seafarer's doctor about this; see Section 6 of the Regulations on medical examination of employees on ships.

- The NSMM's assessment is that if the skipper had attended a medical examination on the day before the accident, with all the medical documentation in the case being known, the correct conclusion by the seafarer's doctor should have been 'temporary declaration of unfitness'[2].

1.11 Measures that have been implemented

1.11.1 Briksdal Adventure AS

The company has revised parts of its safety management system relating to the RIB operation. Handholds have also been fitted for the person sitting on the starboard side of the helmsman and by the middle seat on the bench at the stern.

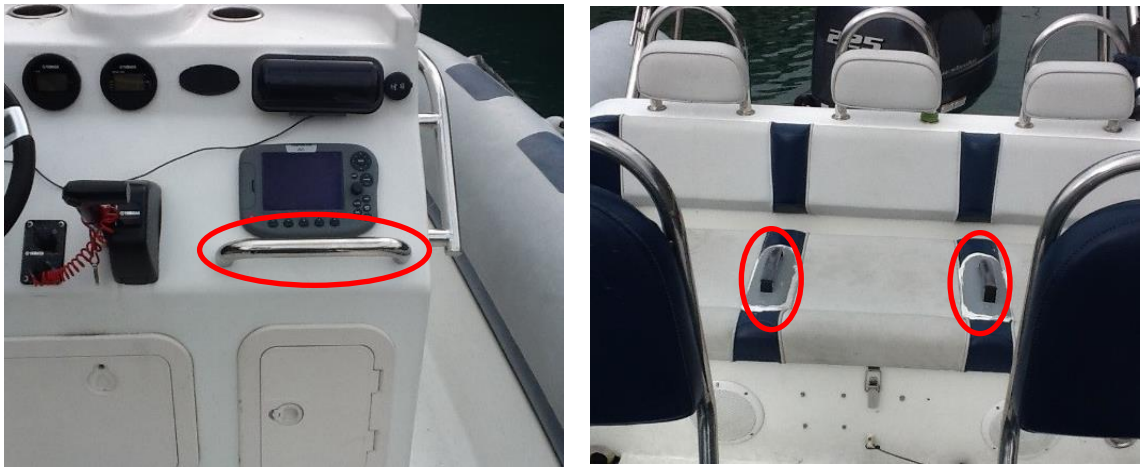

Figure 11: New handholds fitted after the accident. Photo: Briksdal Adventure

Several new buoyancy vests and immersion suits have also been purchased, which satisfy the requirements for buoyancy and thermal insulation.

[2] Regulations on medical examination of employees on ships, Section 12 second paragraph:
'Where an employee fails to satisfy the requirements for a medical certificate set forth in these Regulations, but where he or she within two years may be able to satisfy the requirements of these Regulations, the seafarer's doctor shall issue a temporary declaration of unfitness.'

Briksdal Adventure has also rectified the deficiencies pointed out by the NMA during the inspection after the accident.

1.11.2 Carnival UK

The shipping company that operates the cruise ship *Britannia* carried out an internal investigation into the accident, which then featured in an article about the accident in the company's monthly safety bulletin.

The shipping company has also decided to standardise the type of rescue net used throughout the fleet and is arranging for adequate anchor points, which will enable the nets to be attached to the boats quickly and safely. Telescopic boat hooks will also be procured as an extra aid to simplify the operation of positioning the accident victim in the rescue net.

1.11.3 The Norwegian Maritime Authority

In addition to the inspection immediately after the accident, the NMA reports that they conducted a further inspection, at the request of the tour operator, on 18 May 2016. The NMA reviewed the vessel and the company's safety management system and could confirm that all the safety deficiencies were rectified.

2. ANALYSIS

2.1 Introduction

This maritime accident has been investigated and analysed in accordance with the AIBN methodology[3]. The sequence of events in the accident is clarified using a sequential presentation in a STEP[4] diagram, then the safety problems are identified. Section 2.2 discusses the sequence of events leading up to the people ending up in the water and section 2.3 discusses the subsequent rescue operation.

Based on the safety problems that were identified, the AIBN has then investigated and analysed the following topics: the skipper's actions and health, the company's role and safety management, the NMA's role and the seafarer's doctor scheme.

The AIBN cannot exclude the possibility that the vessel's construction or handling characteristics may have contributed to the accident. However, there are other considerations that in the AIBN's opinion are of greater significance for the prevention of similar accidents, so this topic is not discussed further.

2.2 The sequence of events

As discussed under the sequence of events (section 1.1), the three people fell into the water as the RIB's stern hooked. This is a phenomenon that subjects those on board to a violent sideways force as the boat jerks back into an upright position after heeling sharply inwards during the turn. The AIBN believes that this manoeuvre triggered the accident.

It cannot be ascertained whether the skipper noticed the waves from the tender, but based on the sight lines from the steering position and the fact that the water was completely calm, the AIBN believes that the skipper probably saw the waves. Before departure he had mentioned that the water was calm and that they would therefore have to make their own waves, if they wanted any waves to drive through. The AIBN therefore presumes that the turn was part of the planned trip. Moreover, the skipper had probably seen the waves and possibly saw this as an opportunity to create some excitement for the passengers.

The AIBN is not familiar with the details of the skipper's competence and experience with driving this type of vessel at high speed. It is also unclear to what extent the skipper's state of health and medication may have affected his judgement, reactive capability and other skills. This is discussed in section 2.4.

The violent movement caught the passengers completely by surprise. The passengers were not given any safety briefing or other information about what to expect or what to do during the trip. Neither were they given any warning that a sharp turn was about to happen and they should hold on tightly. The first passenger who fell in the water was sitting to starboard of the skipper and had no handhold within normal reach in front of him. He was therefore holding on to the lower part of his own seat back, but only with his right hand.

[3] Framework and analysis process for systematic safety investigations
[4] Sequentially Timed Events Plotting.

The RIB's skipper was the next to fall out of the boat. It is unclear whether he was aware of the danger of a hook, and to what extent he was prepared for the forces that arise in such a situation. It is also uncertain to what extent the skipper's state of health affected his ability to keep his balance or hold on. The skipper may have seen that the passenger beside him was on his way out of the boat and therefore lost his balance because he was distracted by this, or he may have tried to grab hold of the passenger. Another possible factor is that the skipper, who was standing, had a higher centre of gravity than the others.

The last passenger who was thrown overboard said that he was unprepared for the abrupt movement, and that he was not holding on tightly enough when the accident happened.

The AIBN believes that a good safety briefing and better facilities for holding on, might have prevented the passengers from falling into the water. The AIBN finds that the tour operator's safety management and the NMA's inspection did not adequately contribute to ensuring that these matters were addressed. This is discussed further in sections 2.5 and 2.6.

With no-one at the helm, the boat was still moving at high speed and it continued at high speed through the port turn that the skipper had started. One of the passengers, who had some experience with recreational craft, reacted when the boat did not stop and saw that the «kill cord» had not been pulled out. This passenger's presence of mind and decisiveness in quickly pulling out the «kill cord» prevented the RIB from continuing back to the place of the accident, with a high risk that it would have hit the people in the water and seriously injured them.

If the skipper had attached the «kill cord» to himself, it is probable that the boat would have stopped near enough to those who had fallen overboard for the remaining passengers to help them.

2.3 The rescue operation

The accident happened in the immediate vicinity of the quay in Olden and the two cruise ships that were visiting on the day of the accident. It was daylight, with good visibility and calm weather and wind conditions. This section will discuss notification after the accident, the rescue operation and the survival aspects, in an attempt to illuminate why the accident nonetheless had a tragic outcome.

2.3.1 Notification after the accident

Some time elapsed before the crews of the two cruise ships and the operating company's employees became aware of the accident, and uncertainty as to whether there really was an emergency situation contributed to some extent to the delayed response. The AIBN means that in such situations actions should be implemented, without unnecessary delay, and without risk of endangering other human lives.

The Regulations on the operation of small passenger craft require that a safety briefing is given before departure, which must include information about how to use the safety equipment and how the passengers should act in an emergency. A briefing like this is extremely important and the AIBN mean this should include the options for alerting in an emergency. If the passengers had immediately alerted clearly by using the VHF, the rescue operation could have started up to five minutes earlier.

2.3.2 The rescue operation

The tender from *Seabourn Quest* was the first vessel to arrive at the scene of the accident and was the only vessel on the scene for about two minutes, until the rescue craft from *Britannia* and another RIB from Briksdal Adventure arrived. The crew on board the tender was busy helping the passenger in the water and, as far as the AIBN has been able to ascertain, no assistance was given to the RIB skipper. However, because of the way in which the events unfolded, it is improbable that this played a vital role, and the AIBN has therefore decided not to explore this topic further.

On board *Britannia* it took some time before the crew realized that there was an emergency. After that, they acted very quickly by launching a rescue craft. They prioritised launching it as soon as possible and therefore without complete number of crew. If they had waited for the last crew member it would have further delayed the launch, but possibly have made the actual rescue operation more efficient. The AIBN understands that such choices have to be made quickly and does not believe there is any reason to speculate whether the opposite decision would have changed the outcome.

The rescue craft from *Britannia* arrived at about the time when the skipper was brought up to the surface by the general manager of Briksdal Adventure. The crew of the rescue craft then took charge of the victim and tried to haul him on board using a rescue net. They did not manage to use the net correctly and after a while they gave up the attempt. In the end, the skipper was hauled on board about five minutes after he was brought up to the surface.

The AIBN believes that time was lost in this operation as well, but that it is nonetheless unlikely that this alone played a decisive role in the sequence of events. The shipping company has since taken steps to standardise and improve the rescue nets throughout its fleet. The AIBN has therefore chosen not to discuss this topic any further.

Resuscitation attempts started immediately after the skipper was pulled on board the rescue craft. Resuscitation efforts were continued by medical personnel on board *Britannia* and then in the ambulance helicopter. The AIBN has not seen any reason to examine this part of the rescue work in more detail.

2.3.3 The survival aspect

At a temperature of 10-15 °C, the estimated normal survival time for a person who is able to swim without a life jacket, is one hour or more. Nonetheless, the skipper had problems keeping himself afloat after just five minutes in the water. He was wearing a lined boiler suit with the zip open, which must rapidly have filled with water. This probably contributed to him having problems staying afloat and keeping his head above water. The skipper's state of health may have had some effect, but the AIBN considers it more likely that the skipper's clothing played a more crucial role.

The AIBN believes that the skipper's clothing contributed negatively to his ability to survive. He would have had a much better chance of surviving the accident if he had been wearing an immersion suit with insulation and buoyancy, rather than an open boiler suit without buoyancy. This is discussed in more detail in section 2.5 on the company's role and safety management system.

In view of his clothing, the skipper was dependent on rapid rescue if he was to survive the accident.

2.4 The skipper's actions and health

As described under the assessment of the sequence of events, the AIBN finds that the accident happened as a result of the skipper turning to port into the waves left by a tender. As also mentioned, it is presumed that the skipper had planned this turn as part of the start of the trip.

The AIBN takes it for granted that the skipper did not intend to cause an accident and therefore finds that his understanding of the situation, decisions and actions were not up to the task of averting the accident. Possible explanations for this may be:

1. The skipper noticed the waves too late to deviate from his original plan.

2. The skipper noticed the waves in good time, but did not know that such a manoeuvre could cause hooking. He did not understand the risk to which he was exposing himself and his passengers.

3. The skipper noticed the waves in good time and was aware of the danger of hooking. He underestimated the risk posed by the waves.

4. The skipper noticed the waves in good time and knew about the danger of hooking. He miscalculated his own speed, distance or turning radius, so that he hit the waves in a different way than planned.

Based on documentation that the AIBN has obtained about the RIB skipper's health, as well as medical assessments by Oslo University Hospital and NSMM, the AIBN finds that it cannot exclude the possibility that the skipper's state of health and medication may have affected the sequence of events in this accident. The skipper's medication may have reduced his ability to understand and assess the situation, make good decisions and manoeuvre the vessel safely.

The AIBN has no detailed knowledge about the skipper's competence and experience with driving this type of vessel at high speed. There is therefore no basis for saying which of the above alternatives is the most probable.

The AIBN believes that only skilled skippers in a good state of health in terms of alertness and ability to exercise sound judgement and manoeuvre safely, and who satisfy the requirements for a medical certificate, should be allowed to drive a RIB with passengers at high speed. The NSMM concluded that if the skipper had attended a medical examination the day before the accident the conclusion would have been 'temporarily unfit pending final clarification'. This implies that the probability that the skipper was not medically fit to drive the boat is considered to be so high that he should not have been given the opportunity to drive the boat until he was examined and possibly found fit to drive a boat again.

The AIBN raises the questions of how and why a skipper who should have been declared 'temporarily unfit' could drive a boat in commercial operation, and of what barriers could or should have been in place and/or whether they were defective. The company's role and

safety management is discussed in section 2.5. The AIBN has also looked closely at the seafarer's doctor scheme as a barrier. This is discussed in section 2.7.

2.5 The company's role and safety management

The AIBN believes that many factors that probably contributed to the accident and its consequences can be linked to weaknesses in the safety management system and its implementation. Examples of this are that the skipper was not wearing an immersion suit, failed to hold a safety briefing before departure and did not use the «kill cord» correctly, and that the vessel was not equipped with suitable handholds in all positions.

Based on the boat drivers background and experience the AIBN have reason to believe that the boat driver knew that he should have been wearing proper floatation clothing and connected the «kill cord» to himself. It is however the tour operators task to arrange and monitor that all employees operate safely and follows the companies procedures.

There have also been other findings, which did not have a direct impact on the accident, but which reinforce the impression that the safety management was inadequate. Examples of this are the nonconformities that the NMA pointed out in its inspection report after the accident. The safety management system also left the AIBN with the general impression that it was a reproduction of the applicable regulations. Only to a limited extent was it adapted to the company and its activities.

One manifestation of this lack of adaptation is the reproduction in the safety management system of the required content of a safety briefing. For example, the safety management system states, *'The skipper of the vessel shall inform the passengers about what they must do in an emergency'*. There is no explanation of which possible emergency situations the skipper must address in his briefing or what actions the passengers are expected to take. The AIBN considers that this should have been made specific, in a job description or checklist, to ensure that all skippers hold a sufficiently detailed safety briefing before departure.

If the skipper's failure to comply with the safety management system had been the only sign that the system was not functioning, this might possibly have been blamed on one person's lack of knowledge, will or ability. When in this case the failure can be seen in the context of a number of other deficiencies and weaknesses, the AIBN mean that the skipper's failure to comply with the system must be considered to be a part of a systemic failure. The NMA's role in this connection is discussed in section 2.6.

The AIBN believes that a well-adapted and properly implemented safety management system could have contributed to preventing accidents. In this case it might have prevented the skipper from failing to wear an immersion suit, hold a safety briefing and use the «kill cord». It might also have contributed to revealing that the vessel did not have suitable handholds for all the passengers and that the immersion suits did not meet the requirements in the Regulations on the operation of small passenger craft.

In section 2.4 it appears that it cannot be ruled out that the skipper's state of health and medication may have affected the sequence of events in this accident and that the skipper should have been declared 'temporarily unfit' for health reasons. The operating company has an independent responsibility for demanding a new medical certificate, if it is probable that the employee's state of health is no longer in accordance with regulatory requirements. The general manager of the operating company knew that the skipper had a

number of health problems and that he had been on sick leave, but he did not know the extent of his complaints. As the skipper had a valid medical certificate and worked on an offshore vessel with correspondingly strict requirements, it is understandable that the tour operator did not look into this further.

The company has revised its safety management system since the accident and the NMA has reviewed it, without comment. The AIBN has been made aware of the changes, but believes that the system still has room for improvement. This particularly applies to adapting the system to the company and its activities, as exemplified above. The AIBN therefore submits a safety recommendation to the operating company.

2.6 The Norwegian Maritime Authority's inspection activities

2.6.1 Inspection of companies that operate small passenger craft

The Regulations on the operation of small passenger craft regulate commercial activities using RIBs, like the one involved in this accident. The regulations require the company to have a documented safety management system and to carry out and keep records of an annual self-check. On the other hand, the regulations contain no requirements for any form of approval or inspection in order to be able to start up or run such a company. The only external control mechanism that is specified in the regulations is that the authorities may ask for the above mentioned documentation to be submitted.

As shown in section 2.5, there were several factors that probably contributed to the accident or its consequences that can be linked to weaknesses in the safety management system, or its implementation. An inspection of the vessel would have made it possible to detect specific non-conformities or deficiencies as described above. The safety management system also had deficiencies and weaknesses, which a documentary inspection could have revealed. The AIBN therefore believes that stricter supervision of the operators of RIB vessels would probably reveal this type of weakness and thus contribute to preventing accidents.

2.6.2 Supervision of Briksdal Adventure

The company has operated RIB trips since 2008, without the NMA ever having inspected the company prior to the accident. The day after the accident, the NMA carried out an inspection of the operator as described in section 1.7.2. The supervisory authority's local office did not know about the new checklist and the inspection was therefore reported outside the normal systems. The AIBN presumes that the NMA will take necessary steps to ensure that, in future, all their inspectors will carry out inspections in accordance with the applicable guidelines.

2.6.3 Regulatory instruments to contribute to safe operation of small passenger craft

One instrument that is utilised consists of the Regulations on the operation of small passenger craft, which impose a number of requirements on the operators. Another tool that is used is unannounced inspections. The unannounced inspections that have been carried out in recent years have been directed towards the whole range of craft covered by the regulations. As described in section 1.7.1, these inspections have revealed a large number of nonconformities, many of which were so serious that rectification was demanded before embarking on another trip. Without further work, the NMA cannot sort out which, or how many, of these vessels are RIBs. Nor does the supervisory authority

have an overview of which or how many vessels and companies are covered by the regulations.

The AIBN believes that the authorities need to have a full overview of this class of vessels in order to familiarise themselves with the industry and its scope. This would seem to be a prerequisite for any form of effective supervisory activity. This would also make it much easier to reach the target audience with regulatory updates and any other relevant safety-related information. The AIBN therefore submits a safety recommendation to the NMA, to obtain an overview of RIBs that carry 12 or fewer passengers in commercial operation and the companies that operate them.

Based on the findings made during this investigation, the AIBN shares the concern expressed by the NMA as early as in 2012, after an investigation into the industry in 2011, see section 1.7.1. The AIBN therefore believes that it is necessary for the authorities to intensify the safety activities directed at this group of vessels.

The table below illustrates some of the instruments adopted by Norway, Denmark and Sweden relating to the operation of small passenger craft:

Table 1: Instruments adopted by Norway, Denmark and Sweden relating to the operation of small passenger craft.

	Norway	**Denmark**	**Sweden**
Registration of craft		Yes	Yes
Initial approval		Yes[1]	
Permit/certificate		Yes, valid for 2 years	
Periodic inspection		Every 2nd year[1]	
Operator inspection	Annually	Every 2nd year[2]	Annually
Competence requirements for driving high-speed craft			Yes[3]

[1] Covers construction, machinery, equipment, suitability and compliance with the safety provisions in the regulations
[2] Declaration to be submitted to the inspection authority
[3] At max speeds > 35 knots. Total of 40 hours (navigation, driving techniques and safety)

Based on the above the AIBN submits a safety recommendation to the NMA to implement further measures to control that operators of RIBs carrying 12 or fewer passengers are operating in accordance with the applicable regulations. The NMA should be the correct body to decide which instrument(s) should be adopted to bring safety in this industry up to a satisfactory level in the most effective manner. The instruments listed above all seem to be relevant in the light of this investigation.

2.7 The seafarer's doctor scheme

The investigation has shown that the seafarer's doctor did not have complete information about the skipper's state of health and medication. This applies both to the information that was available at the time of issuing the last medical certificate (issued in November 2014, valid until 11 November 2016), and to changes in the skipper's state of health and medication during the period after November 2014.

In order to act as a barrier, the seafarer's doctor scheme depends on correct information about the seafarer's health and on the seafarer's doctor carrying out adequate and thorough examinations (including obtaining necessary information from GPs and carrying out clinical examinations). In the present case it was found that the skipper's self-declaration at the medical examination in November 2014 had not been correctly completed and that the seafarer's doctor had not detected this. However, according to the NSMM, the seafarer's doctor's assessment in this case would probably have been the same, even if the self-declaration had been correctly completed and the seafarer's doctor's documentation, clinical examinations and opinion had been complete.

The NMA must start risk-based supervision of the seafarer's doctors' activities. The AIBN considers that this supervision should include supervision of the quality of the medical examinations carried out and opinions arrived at in individual cases. On a general basis, it is also important for the competence and training requirements for the seafarer's doctors to be of sufficient scope, quality and regularity for the seafarer's doctors to constitute an effective barrier.

In the period after November 2014 several changes in the skipper's state of health and medication arose that should have been notified to the seafarer's doctor, pursuant to Section 6 of the Regulations on medical examination of employees on ships. It is possible that the skipper did not know about this obligation and/or that he did not perceive his state of health to be worse than before. The NSMM has informed the AIBN that this duty of notification is not clearly communicated and that it is probable that there are few employees who have studied the regulations in detail and understood this. The AIBN therefore believes that the NMA should consider how this may be more clearly communicated, for example as mandatory information in connection with the seafarer's doctor's examination.

Both the GP and the specialist had information about the skipper's state of health. However, the Health Personnel Act does not permit medical staff to inform the seafarer's doctor that a seafarer no longer satisfies the medical requirements. Apart from what has been found in this particular accident, the AIBN does not know the scope of the problem, but the Head of the NSMM told Maritime.no on 16 June 2016 that *'the lack of notification arrangements at sea comprises a significant safety risk'*[5].

Based on the present investigation, the AIBN supports the proposal from the NMA and the Ministry of Trade, Industry and Fisheries as mentioned in chapter 1.9 about the duty to report on seafarers health into Health Personnel Act § 34, and submits a safety recommendation to HOD that this should be considered.

[5] http://maritime.no/nyheter/livsfarlig-at-det-er-opp-til-sjomannen-selv-a-varsle/ (read 1 August 2016).

3. CONCLUSION

3.1 The sequence of events

a) The accident happened as a result of the RIB hooking when the skipper turned the boat into the waves left by a tender. This caused the RIB to right itself abruptly after heeling sharply and subjected those on board to a strong sideways force.

b) Two passengers fell into the water because they were not prepared for the abrupt movement and were not holding on tightly enough when the boat hooked. Some of the seating positions in the boat did not have suitable handholds to hold on to.

c) The skipper also fell into the sea as a result of the violent movement. It is possible that he attempted to grab hold of the passenger on his starboard side, who was the first to fall overboard.

d) The skipper had not attached the «kill cord» to himself and the RIB therefore continued moving at high speed in the turn to port that the skipper had initiated.

e) Quick action by one of the passengers, who quickly pulled out the «kill cord», prevented the RIB from continuing back to the scene of the accident, with a great risk that it would have hit the people in the water and seriously injured them.

f) The skipper had problems staying afloat and holding his head above water after just a few minutes. He soon lost consciousness and died as a result of drowning. The skipper was dressed in an open boiler suit without buoyancy and this contributed negatively to his ability to survive.

g) The remaining passengers had not been informed about how to raise an alarm effectively in an emergency, or that there was a VHF radio on board.

h) Uncertainty around whether it actually was an emergency contributed, to a certain extent, a delayed initiation of the rescue operation. In such situations actions should be implemented, without unnecessary delay, and without risk of endangering other human lives.

3.2 The tour operator’s safety management and the NMA’s supervisory activity

a) The company’s safety management system was inadequate in some areas and could have been better implemented and it did not fully contribute to ensuring the safety of those on board.

b) The company has revised its safety management system since the accident and the NMA has reviewed it, without comment. The AIBN considers that the system still has room for improvement. This particularly applies to adapting the system to the company and its activities.

c) The NMA’s safety work and supervision of the RIB industry does not contribute sufficiently to ensuring the safety of those on board. An inspection could have revealed deficiencies in the vessel and equipment, as well as weaknesses in the safety management system. Moreover, no overview exists of this group of vessels or the

companies involved, which is a prerequisite for carrying out targeted and effective supervision.

3.3 The skipper's health and the seafarer's doctor scheme

a) The skipper's medical condition had changed during the period since his previous medical certificate and the seafarers' doctor had not been notified about this. The NSMM concluded that if the skipper had attended a medical examination the day before the accident the conclusion should have been 'temporarily unfit pending final clarification'.

b) It cannot be excluded that the skipper's state of health and medication may have contributed to him having reduced capability to understand and assess the situation, make good decisions and manoeuvre the vessel safely.

c) The seafarers' doctor was not fully informed about the skipper's state of health and medication despite both his general practitioner (GP) and specialist having information about these matters. The Health Personnel Act does not permit medical personnel to inform the seafarers' doctor that a seafarer does not meet the health standards.

4. SAFETY RECOMMENDATIONS

The investigation into this marine accident has identified several areas in which the Accident Investigation Board Norway deems it necessary to propose four safety recommendations for the purpose of improving safety at sea.[6]

Safety recommendation MARINE No 2017/02T

The investigation into the RIB accident in Olden on 22 July 2015 has shown that the operating company's safety management system was inadequate in some areas and could have been better implemented. The company has revised its safety management system since the accident and the NMA has reviewed it, without comment. The AIBN considers that the system still has room for improvement.

The Accident Investigation Board Norway recommends that Briksdal Adventure AS review its safety management system, with the focus on preparing and implementing good safety procedures adapted to the company and its activities.

[6] The investigation report is submitted to the Ministry of Trade, Industry and Fisheries, which has the overall responsibility for the follow up of safety recommendations.

Safety recommendation MARINE No 2017/03T

The investigation of the RIB accident in Olden on 22 July 2015 has shown that there is no register or overview of RIBs that carry 12 or fewer passengers, or of the companies that operate them. The AIBN believes that the authorities need to obtain such an overview in order to gain a full understanding of the industry and its scope, and to conduct effective and purposeful safety work.

The Accident Investigation Board Norway recommends that the NMA take necessary steps to obtain an overview of RIBs that carry 12 or fewer passengers in commercial operation and the companies that operate them.

Safety recommendation MARINE No 2017/04T

The investigation into the RIB accident in Olden on 22 July 2015 found several operational and physical deficiencies and nonconformities, and also that the operating company's safety management system was inadequate in some areas and could have been better implemented. Based on these findings, the AIBN shares the concern expressed by the NMA as early as in 2012, after an investigation of the RIB industry in 2011. The AIBN considers that it is necessary for the authorities to intensify the safety work directed at this group of vessels.

The Accident Investigation Board Norway recommends that the NMA implement further measures to control that the operators of RIBs carrying 12 or fewer passengers are operating in accordance with the applicable regulations.

Safety recommendation MARINE No. 2017/05T

The investigation showed that the skipper's state of health and medication may have contributed to the sequence of events in the RIB accident in Olden on 22 July 2015. The skipper's state of health had changed during the period since his previous medical certificate had been issued and the seafarers' doctor had not been notified of this. Both the GP and the specialist had information about the skipper's state of health. However, the Health Personnel Act does not permit medical staff to inform the seafarer's doctor that a seafarer no longer satisfies the medical requirements.

The Accident Investigation Board Norway recommends that the Ministry of Health and Care Services (HOD), as part of its consideration of amendments to Section 34 of the Health Personnel Act should include a proposal that employees on board ships, who are required to have medical certificates, should be covered by the duty of notification in Section 34.

Accident Investigation Board Norway

Lillestrøm, 13 March 2017

DETAILS OF THE VESSEL AND THE ACCIDENT

The vessel	
Name	Ribeye 785
Flag state	-
Class society	-
IMO Number/Call signal	-
Type	Rigid-inflatable boat (RIB)
Build year	2007
Owner	Briksdal Adventure AS
Operator/Responsible for ISM	-
Construction material	Fibreglass and rubber
Length	7.8 m
Gross tonnage	-
Safety crew	-
The voyage	
Port of departure	Olden, Norway
Port of arrival	Olden, Norway
Type of voyage	Inshore, on the fjords
Load	9 passengers
Persons on board	10
Information about the accident	
Date and time	22 July 2015, at 13:03
Type of accident	Personal injury
Place/position where the accident occurred	Olden
Place on board where the accident occurred	-
Injuries/deaths	1 death
Damage to vessel/the environment	-
Vessel operation	Sightseeing trip with paying passengers
At what point of its route was the craft	En route
Environmental conditions	It was cloudy with a light drizzle in the air, light breeze and no waves. The water in the fjord was around 14 ºC at the surface and 11 ºC at 8 metres' depth.