Report of the investigation of

the grounding of

Aqua-boy

Sound of Mull

11 November 2006

Marine Accident Investigation Branch
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Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AIS	-	Automatic Identification System
Circ	-	Circular publication
CCTV	-	Closed circuit television
ECDIS	-	Electronic Chart Display and Information System
ETA	-	Estimated time of arrival
GIS	-	Geographic Information System
GMDSS	-	Global Maritime Distress and Safety System
gt	-	gross tonnage
ILO	-	International Labour Organisation
IMO	-	International Maritime Organization
kW	-	kiloWatt
LW	-	Low water
m	-	metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MSC	-	Maritime Safety Committee
STCW 95	-	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, (as amended)
UTC	-	Universal Time Coordinated
VHF	-	Very high frequency
WHO	-	World Health Organisation

SYNOPSIS

Times are UTC

At about 0115 on the morning of 11 November 2006, the Norwegian registered *Aqua-boy* ran aground about 20m from Ardtornish Point Lighthouse in the Sound of Mull. She remained aground until 0645 when she refloated on the rising tide. *Aqua-boy* was then able to make her way to Oban, where an underwater survey of the damage was carried out.

Aqua-boy had been operating on the west coast of Scotland for over 15 years. Designed to carry live fish, she was engaged in the fish farming industry, transporting fish at various stages in their development between fish farms. At the time of the accident, the vessel was on passage from Gigha towards the Kyle of Lochalsh with the master alone on watch.

As *Aqua-boy* turned into the Sound of Mull, she entered comparative shelter, and vessel movement reduced. The effect of this, combined with the master's already fatigued state, was enough to cause him to fall asleep.

The master woke with the impact of the vessel running aground. The mate, who was awake in the mess room, went to the bridge to see what had happened. After checking that the remaining crew member was awake, he then went forward to assess the damage.

The master made a brief effort to refloat the vessel by running the engines astern. When this was unsuccessful, he contacted the Coastguard, who then transmitted a "Mayday Relay". This was acknowledged by *Ronja Commander*, a vessel of similar size to *Aqua-boy.* However, at 0246, the Coastguard was informed that *Skan Viking*, another vessel of similar size, was already in position and attempting to tow *Aqua-boy* off the rocks.

Skan Viking made two unsuccessful attempts and was then released when *Ronja Commander* arrived on scene at about 0400. *Ronja Commander* made her first attempt to tow *Aqua-boy* at 0408. This failed when the towline broke, and a second unsuccessful attempt was made at 0414.

Aqua-boy refloated on the rising tide at 0645 without further assistance. She proceeded directly to Oban for an underwater survey, and remained there until a repair port was organised.

The accident occurred following the master's failure to take avoiding action on account of his having fallen asleep and then remaining asleep on watch. The following safety issues were identified:

- The master's hours of rest did not meet the statutory minimum.
- In choosing to work more hours than were necessary, and restricting his intake of food, the master exacerbated his level of fatigue without taking full account of the probable consequences.
- Although a watch alarm was fitted, the alarm system was turned off.
- No lookout was posted and so the master was alone on watch.
- The vessel was operating below her minimum safe manning level.

Actions have since been taken by the MCA and the vessel's owners. A recommendation has been made to the owners of *Aqua Boy* on the provision of formal instruction to the vessel's master on action to be taken if it becomes apparent to him/her that the statutory minimum hours of rest requirements may not be achieved.

Figure 1

Aqua-Boy

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *AQUA-BOY* (Figure 1) AND ACCIDENT

Vessel details

Registered owner	:	Aqua Ship, ANS
Port of registry	:	Bergen, Norway
Previous Names		Konkurs 1-1988, ex-Antonsen Senior – 1987 ex- Peer Gynt – 1985
Flag	:	Norway
Type	:	Live fish carrier (well boat)
Built	:	1982
Classification society	:	Not classed
Construction	:	Steel
Length overall	:	33.2m
Gross tonnage	:	312
Engine power	:	460kW
Service speed	:	9.5 knots
Other relevant info	:	Single fixed pitch propeller, Becker rudder and bow thrusters

Accident details

Time and date	:	0130 (UTC), 11 November 2006
Location of incident	:	56º 31'N 005º45' W Ardtornish Point, Sound of Mull, Scotland
Persons on board	:	3
Injuries/fatalities	:	None
Damage	:	Deep scoring and denting of hull plating forward, and damage to the protection cages around the sea water inlet valves. Two splits in the hull next to the bow thruster tunnel.

1.2 BACKGROUND

1.2.1 *Aqua-boy*

Aqua-boy was a live fish carrier, employed in the transfer of live fish for the fish farming industry of the west coast of Scotland **(Figure 2)**. Alternatively described as a well deck vessel, she had two large tanks amidships, in which the live fish were carried. The fish were either smelt being transferred from the hatchery to fresh water farms, or juvenile fish being transferred to sea water farms.

The live fish tanks were fitted with a sophisticated monitoring system to ensure that the fish remained in good condition throughout the voyage. The fish were transferred from the ship to the farms through the ship's pipeline system, which incorporated a fish counting system.

The accommodation on board comprised single berth cabins for the master and mate, with two twin berth cabins for the two remaining crew.

At 312gt, *Aqua-boy* was not required to have a safety management system on board, and written instructions for the management of the vessel were not required, either nationally or internationally.

Aqua-boy was not classed with a classification society, certification being provided by the Norwegian Maritime Directorate (Sjøfartsdirektoratet). The ship was restricted to a trading area of "North Sea and Baltic, within area A1, A2", which included the British Isles. The Norwegian Maritime Directorate had issued the vessel with a Safe Manning Certificate for four crew, on a two watch system. The complement described was master, chief officer, ordinary seaman / engine room attendant, and ordinary seaman / cook.

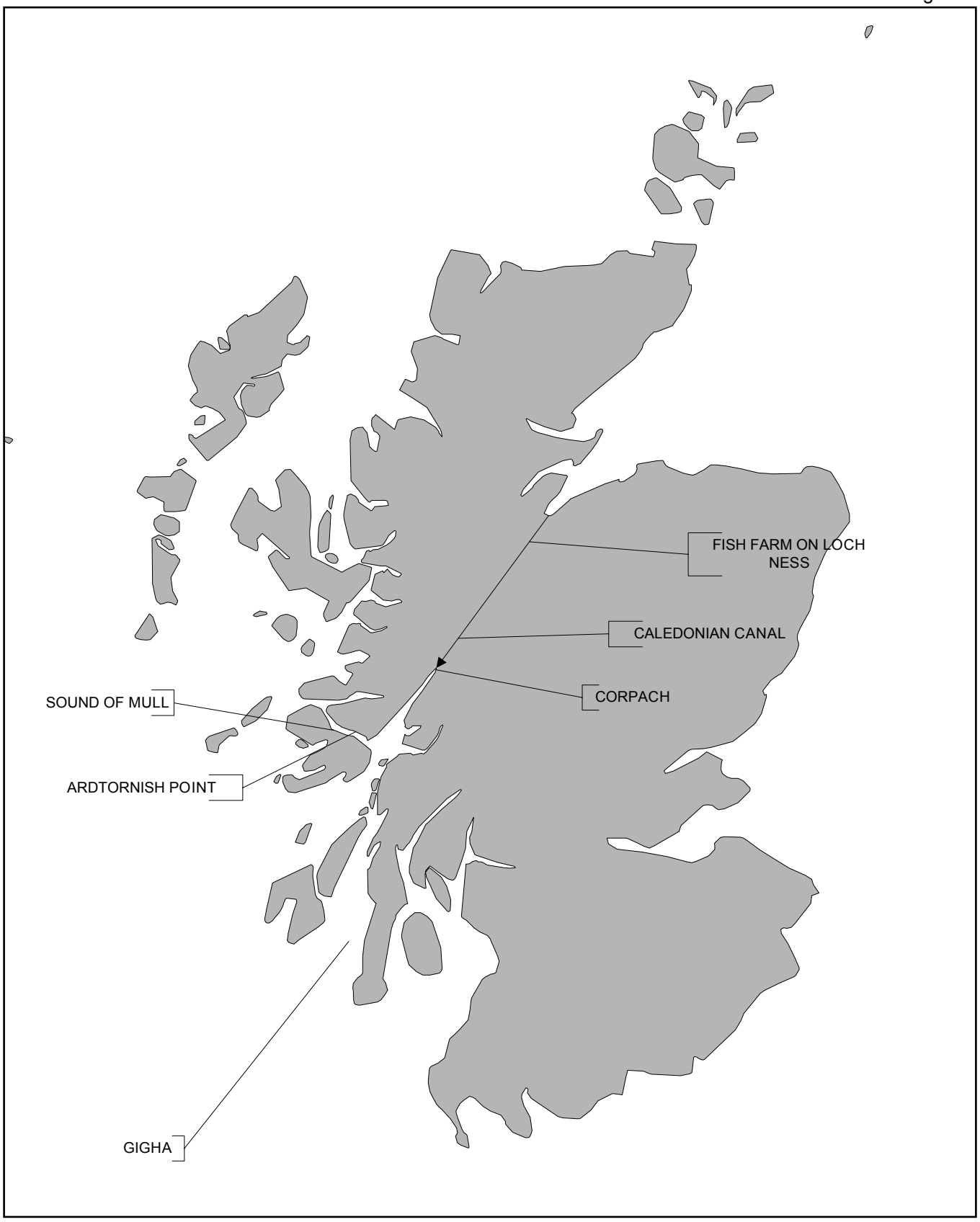
The master and mate worked a 6-on, 6-off watch system with the master and mate keeping the 8 – 2 and 2 – 8 watch respectively.

Where the programme allowed, at night the vessel would lie alongside a fish farm or at anchor near a fish farm, since it was unusual to work the fish at night. With fish on board, one of the crew remained on the bridge to ensure that the oxygen levels in the tanks were maintained. With no fish on board and the vessel alongside, everyone went to bed. The vessel would not approach a fish farm at night, or in bad weather, as it was impossible at such times to see the edge of the farm and any trailing ropes. The owner was content for either the master or mate to load and discharge the fish. However, the master felt that this was his responsibility, and so he was always on the bridge at such times. This increased the master's hours of work, and the mate would often cover part of the master's navigation watch to allow the master to rest.

1.2.2 Aqua Ship ANS

The company owning *Aqua-boy* was registered at Rong in Norway. The small management team consisted of three people, with the day-to-day running of the company left to one man. This man is referred to as the "owner" throughout this report. The company also operated a second vessel, *Aqua-prince*, which was a smaller general cargo ship, based in Norway. The company's fleet had consisted of four vessels until 1996, when a restructuring took place among the management team, leading to the present arrangements.

Figure 2



Map of Scotland

The owner often sailed with *Aqua-boy*, usually as an additional member of the crew, but on occasion acting as either the ordinary seaman / engine room attendant, or the ordinary seaman / cook, i.e. as the fourth member of the crew.

1.3 NARRATIVE

Times are UTC

Aqua-boy was on a familiar run. She was transferring live fish from a farm in Loch Ness to another farm off the island of Gigha. The next passage was from Gigha to Kyle of Lochalsh in ballast. In Kyle of Lochalsh she was due to load another cargo of smelt. She had arrived at Corpach at the southern entrance to the Caledonian Canal on the evening of 7 November 2006, and had moored at the canal entrance just before midnight, ready to enter the canal the following morning. On the morning of 8 November, she entered the canal at 0710, and was alongside the fish farm at the northern end of Loch Ness by 1745. Loading commenced shortly afterwards and was completed at 2220. *Aqua-boy* then remained alongside the fish farm until 0600 on 9 November, when she started her passage to Gigha.

The owner was on board *Aqua-boy* acting as the fourth crew member, while the regular crew man was on holiday. In addition to the four crew members, the vessel was carrying a fish farm worker, whose job it was to monitor the health of the fish on board. Arriving at Corpach in the evening of 9 November, the owner left the vessel to return to Norway for personal reasons. This left the vessel with four persons on board.

Aqua-boy cleared Corpach at 1740. The vessel arrived at the fish farm off Gigha at 0150, and since it was too dark to approach the fish farm, dropped her anchor, the master intending to move alongside the farm at first light to discharge the cargo of smelt. The master went to bed, leaving the mate on anchor watch. At first light, the wind was SW 6-8 and the sea state too rough to go alongside the farm, so the vessel remained at anchor. The master had been called at 0700 as he had instructed, and took over the watch shortly afterwards awaiting a weather window to go alongside the farm.

By 1500 the weather conditions had eased sufficiently to allow the vessel to berth. The master was still on the bridge, and remained there during the discharge.

The plan was then for the vessel to sail in ballast from Gigha to the Kyle of Lochalsh. With no fish on board, the fish farm worker left the vessel at Gigha. This left three persons on board: the master, mate and ordinary seaman / engine room attendant. The vessel was due to pick up the new fourth crew member on arrival at Kyle.

Aqua-boy sailed from Gigha at 1915, and although it was the mate's scheduled period of duty, the master remained on watch. The mate suggested that the master should rest, but the master replied that he had some telephone calls to make and therefore may as well stay on watch. The mate, who was fully rested, went below to the mess room.

At about 2230, the mate went to the bridge again, taking coffee to the master, and again offered to take over the watch or to bring the master food. All offers of assistance were refused. The mate left the bridge at about 2300 and returned to the mess room.

At 0030, the vessel passed Lady Rock at the entrance to the Sound of Mull. The mate again returned to the bridge at about 0045, but the master indicated that he wished to remain on the bridge to the end of his watch at 0200. The mate again returned to the

mess room after which the master fell asleep. At about 0115, the mate felt the vessel vibrate and heard crunching noises. He returned to the bridge, where he found the master awake and the vessel aground about 20m from Ardtornish Point Lighthouse. After checking that the remaining crew member was awake, he went forward to assess the damage.

The master made a brief effort to get the vessel off the rocks by putting the engines astern, but when this failed he called the Coastguard. This first call was logged by the Coastguard at 0133. Following conversations between the Coastguard and *Aqua-boy*, *Ronja Commander*, a vessel of similar size to *Aqua-boy,* responded by offering assistance. She gave an ETA of 2½ hours, however, by 0246, *Skan Viking*, another vessel of similar size, was already attempting to tow *Aqua-boy* off the rocks.

Skan Viking made two attempts. Neither was successful as on both occasions the mooring lines used to connect the tow parted. As a precaution, the Tobermory Lifeboat was launched in case *Aqua-boy* took on water and sank once she was off the rocks. However, the master of *Aqua-boy* was confident that the damage to his vessel was not serious, and that he would be able to float once off the rocks. Auxiliary coastguards attended the scene, and they were able to inform the crew of the extent of the damage, since towards low water they were able to walk out to the vessel and inspect the hull **(Figure 3)**.

Ronja Commander arrived on scene at about 0400, and *Skan Viking* was released. *Ronja Commander* made her first attempt to tow *Aqua-boy* off at 0408. This failed when again the towline broke. A second unsuccessful attempt was made at 0414. Further attempts were then postponed until the tide had risen. LW had been at 0314, and the vessel was not expected to float until 0600 at the earliest **(Figure 4)**.

At about 0635, the master of *Aqua-boy* felt the vessel moving, and tried the engines astern. At 0645, *Aqua-boy* refloated under her own power and made her way to Oban, escorted by the lifeboat. An underwater survey was carried out in Oban and the vessel remained there until a repair port was organised.

1.4 ENVIRONMENTAL CONDITIONS

Wind	-	SW 7-8
Sea State	-	Sheltered waters
Weather	-	Rain, partly cloudy
Visibility	-	More than 6 miles
Sunrise	-	0752
Tides – Oban	-	HW 0858
		LW 0314

Figure 3

Photograph taken on scene by auxiliary coastguard

Figure 4

Photograph taken on scene by RNLI crewman

1.5 THE CREW

The crew worked a 5 week on, 5 week off work/leave rotation, with adjustments made in November and December to ensure that the 2 crews had Christmas at home in alternate years.

1.5.1 The master

The 46 year old master had started working at sea at the age of 16, taking his first certificate of competency in 1981. He had been employed on well boats since 1983, joining Aqua Ship ANS in 1993. He first joined *Aqua-boy* in February 2001, and had been with the vessel ever since, working mainly on the west coast of Scotland. The master held a master's certificate of competency limited to ships of less than 750gt and to the North Sea and Baltic Sea trading area. This equated to a Norwegian Deck Officer Class 5 Certificate of Competency and was an appropriate qualification for the size of vessel and the trading area.

On this occasion, the master had been on board for 3½ weeks, and expected to complete his trip at the end of the fourth week, to allow the rotation for Christmas leave.

For the 9 hour transit of the Caledonian Canal, the master normally took the watch himself. The mate normally took the watch for the 3 hour transit of Loch Ness to the fish farm. When going alongside a fish farm, the master was always on watch and considered it his duty to take charge of any movement of the fish cargo; he was therefore also on watch whenever cargo was loaded or unloaded. However, he was content for the mate to take the vessel away from the fish farms and to anchor her.

1.5.2 The mate

The mate was 44 years old and had been with the company for 4 months. He had been working on well boats for the past 3 years, and this was his second tour of duty on the vessel.

The mate held a master's certificate of competency limited to vessels of less than 500gt and to North Sea and Baltic Sea trading areas. This also equated to a Norwegian Deck Officer Class 5 Certificate of Competency.

1.6 DAMAGE

The resulting damage was restricted to the forward third of the vessel, and consisted of some deep scoring and denting to the hull. In addition, the hull was split in two places. Each split was about 10cm long and both splits were in the vicinity of the bow thruster tunnel, one to port and the other to starboard **(Figures 5a, 5b, 5c)**.

Although the splits in the hull were small, they were below water level and allowed free flooding of the forward ballast tank. Since this had been partly full before the grounding, there was little change to the vessel's draught when she refloated.

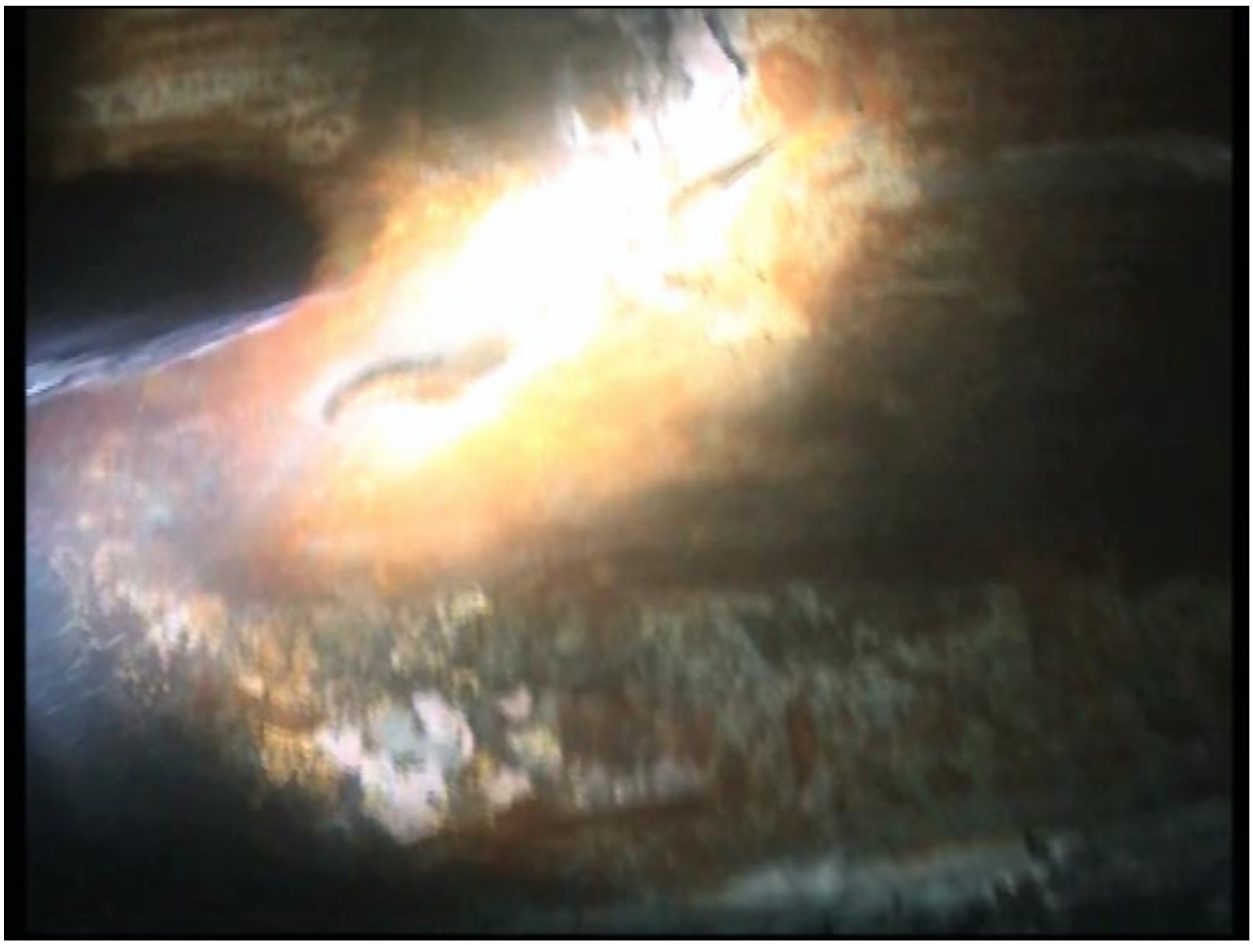
1.7 BRIDGE LAYOUT

The bridge of *Aqua-boy* was compact, with the equipment fitted divided between that required for navigating the vessel and that for monitoring the live fish. The majority of this equipment was fitted along the front of the bridge and is described more fully in section 1.8. There was a small chart room at the back of the bridge containing the communications equipment and the chart table and chart storage.

Figure 5a

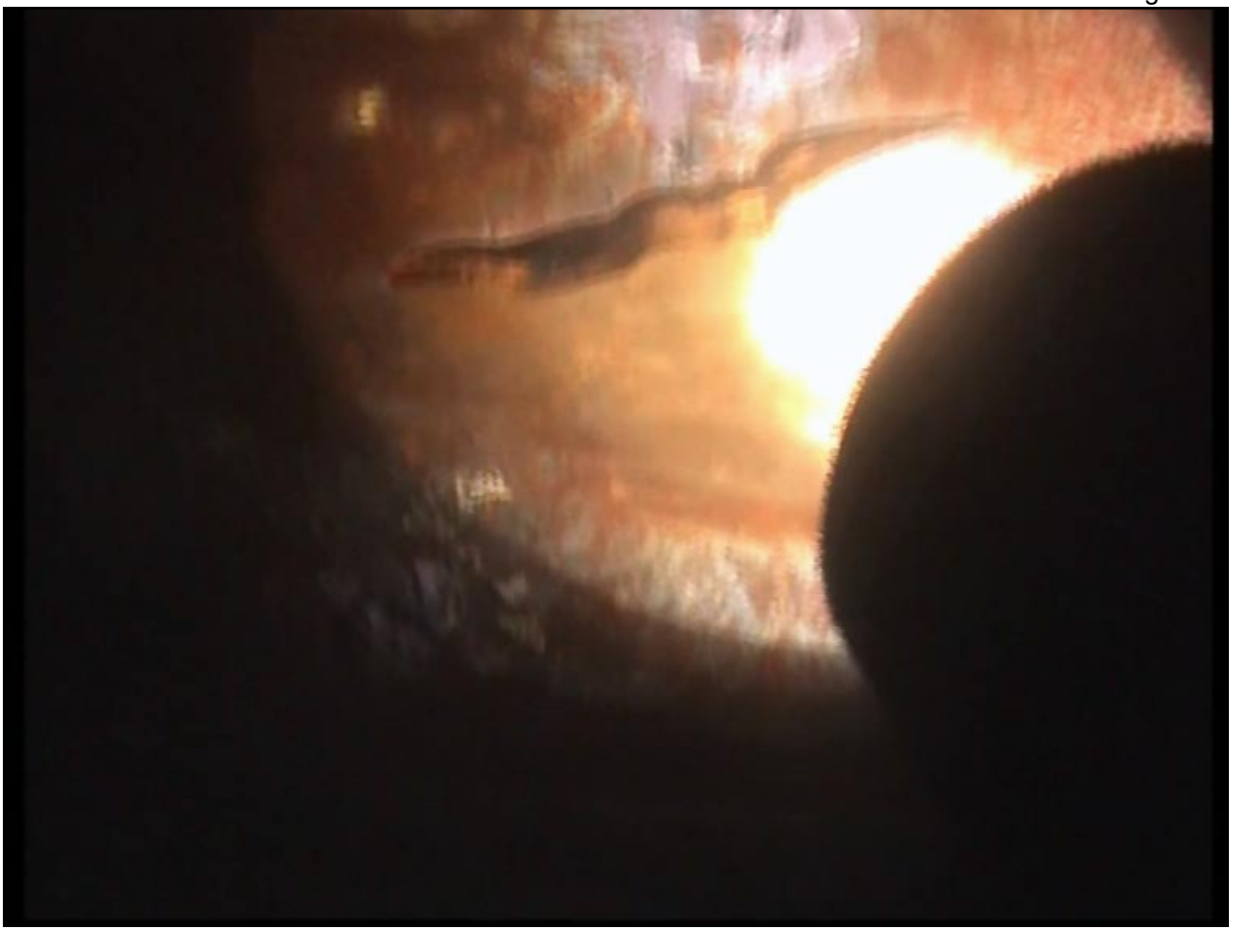
Damage to sea valve protection cage

Figure 5b



Split in port side of hull

Figure 5c



Split in starboard side of hull

At either end of the console housing the navigation and fish monitoring equipment was a watchkeeper's chair. The steering and engine controls, ECDIS, radar and other navigation electronics were all within reach and view of a person sitting in the starboard chair. However, the chair was fitted close to the bridge front and, in order to fit the footrest in the space available, it had been fixed permanently facing about 45º to port **(Figure 6)**. This meant that if the watchkeeper wished to look to starboard, he had to look over his right shoulder **(Figure 7a)**. In addition, the view looking ahead from the starboard watchkeeper's chair was partially obscured by the frame of the bridge windows.

Figure 6

Composite photograph illustrating view from starboard chair

1.8 BRIDGE EQUIPMENT

Around the starboard watchkeeper's chair were fitted a radar, ECDIS, the AIS receiver which was linked to the ECDIS, the steering, engine and bow thruster controls and a VHF radio handset **(Figures 7a, 7b)**. The operation of each piece of equipment could be carried out without the watchkeeper moving from the chair. This operating position occupied a little under half of the available space at the front of the bridge. The rest of the space was taken up with the console containing the equipment for monitoring the condition of the fish and the second watchkeeper's chair on the port side of the bridge.

The console included the readouts from the sensors for oxygen and temperature, as well as CCTV which provided views of the tanks, and the fish counting equipment. The remote controls for the water circulating pumps, oxygenating plant, as well as the pumps for discharging the fish were also contained in this console.

The small chart room at the back of the bridge contained the GMDSS communication equipment, in addition to the chart table with paper chart storage. The computer for ship's business was also sited in the chart room as this was the only available office space on the vessel.

A watch alarm was fitted. This consisted of a motion sensor directed at the starboard watchkeeper's chair. Any movement within the viewing arc of the sensor would reset the timer and the alarm would not sound. The control panel was situated to port and within reach of the starboard watchkeeper's chair. The alarm system was turned off at the time of the accident.

1.9 FATIGUE

1.9.1 Hours of rest

STCW 95 Regulation VIII/1 requires that:

Each Administration shall, for the purpose of preventing fatigue:

1. *establish and enforce rest periods for watchkeeping personnel; and*
2. *require that watch systems are so arranged that the efficiency of all watchkeeping personnel is not impaired by fatigue and that duties are so organized that the first watch at the commencement of a voyage and subsequent relieving watches are sufficiently rested and otherwise fit for duty.*

The Seafarer's Hours of Work and the Manning of Ships Convention, 1996, known as ILO180, sets out minimum hours of rest for seafarers and was ratified by Norway, with an effective date of 22 April 2004. These are 10 hours in any 24 hour period and 77 hours in any 7 day period.

1.9.2 Advice concerning fatigue

ILO 180 is implemented for the UK by The Merchant Shipping (Hours of Work) Regulations 2002, as amended. In respect of statutory minimum hours of rest, the regulations provide for the inspection of a non-UK ship which has called voluntarily at a port in the UK in the normal course of its business or for operational reasons, to verify compliance and to ensure that any deficiencies which are clearly hazardous to the safety or health of seafarers are rectified.

Figure 7a

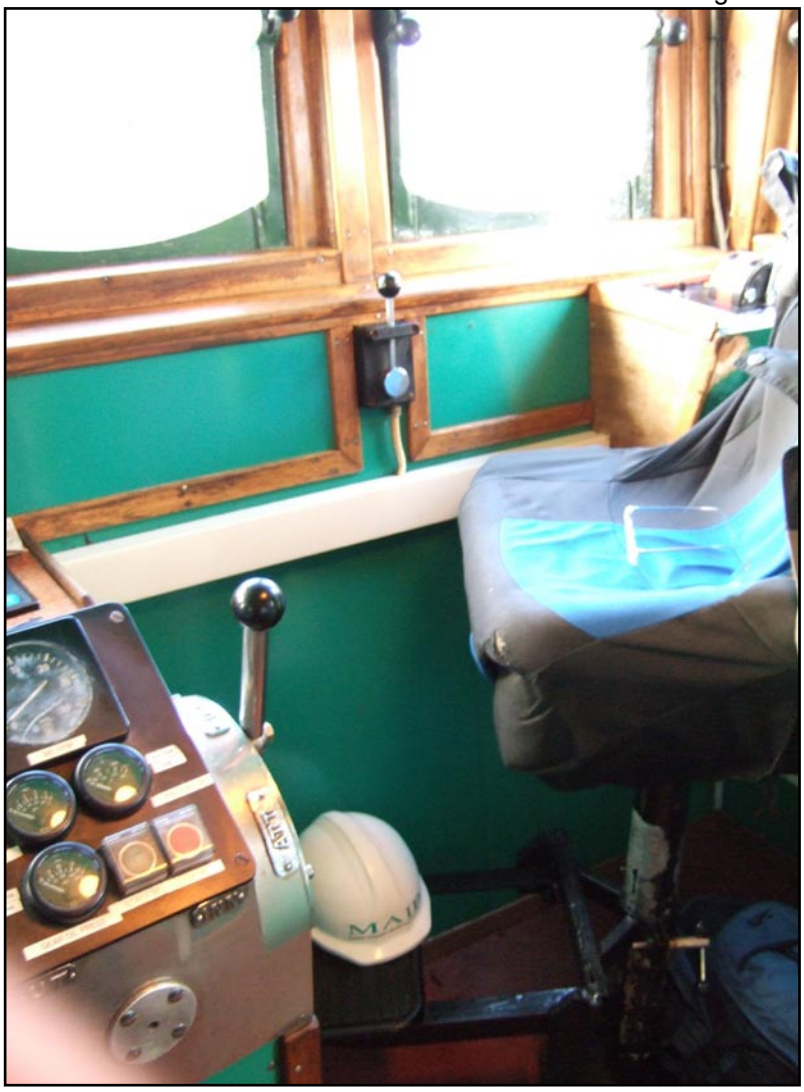


Figure 7b

The starboard watchkeeper's chair

Much advice is available concerning the dangers and mitigation of fatigue. STCW 95 Section B-VIII/1 (Guidance regarding fitness for duty) states that *everyone involved in ship operations should be alert to the factors that can contribute to fatigue*. These are detailed in the annex to IMO resolution A772(18) and include factors relating to management ashore and aboard ship, such as scheduling of work and rest periods and watchkeeping practices; ship-specific factors, such as level of automation, motion characteristics and ship design; crew-specific factors, such as crew competency and quality; and external environmental factors, such as weather.

Further advice has been issued by the IMO in MSC/Circ 1014 (Guidance on fatigue mitigation and management) issued in June 2001. This large document is divided into a series of 9 modules, with Module 1 dealing with general background information on the subject, and Modules 2 – 9 containing practical information to assist interested parties to better understand and manage fatigue. The modules are specifically targeted to different areas of the industry (ie ratings, officers, masters, training institutes, owners and operators, ship designers, marine pilots and tugboat personnel).

Module 4 is entitled *Fatigue and the Master*. It describes some of the possible causes and effects of fatigue and the symptoms associated with them. It also provides advice on how to prevent the onset of fatigue, with particular regard to sleep and rest issues, and how to mitigate its effects, with particular reference to interest, the working environment, food intake and physical activity. It is noted in the module that *it is difficult for an individual to recognize the symptoms of fatigue within him/herself, because fatigue impairs judgement* **(Annex)**.

In November 2001, the MCA issued MGN 211(M) entitled “Fatigue: Duties of owners and operators under merchant shipping legislation”. The purpose of this MGN was to remind owners and operators of their responsibility for ensuring that masters and crews are adequately rested to perform their duties safely. The guidance draws attention to STCW 95 on the fitness for duty of watchkeepers, and the principle that *any crew member should ensure that they are well-rested before going on duty, particularly where they have responsibilities for the navigation of the vessel*.

1.10 WATCHKEEPING

STCW 95 section A VIII/2 part 3.1 describes the principles to be observed in keeping a navigational watch. This refers to the requirement to maintain a lookout, and follow the International Regulations for Preventing Collisions at Sea 1972. The section also offers advice concerning the make-up of the watch, and states in section 15 that

The officer in charge of the navigational watch may be the sole look-out in daylight provided that on each occasion:

1. *the situation has been carefully assessed and it has been established without doubt that it is safe to do so:*
2. *full account has been taken of all relevant factors, but not limited to:*
    - *state of weather*
    - *visibility*
    - *traffic density*

- *proximity of dangers to navigation, and*
- *the attention necessary when navigating in or near traffic separation schemes; and*

3. *assistance is immediately available to be summoned to the bridge when any change in the situation so requires.*

STCW 95 also states that the management company of a ship also has a responsibility for ensuring that the obligations given in the code are given 'full and complete effect'.

The UK Maritime and Coastguard Agency provides further advice in the form of MGN 137(M+F) entitled "Look-out during periods of darkness and restricted visibility" and MGN 315(M) entitled "Keeping a safe navigational watch on merchant vessels".

MGN 137(M+F), which applies both to UK ships wherever they may be and other ships operating in UK territorial waters, states

Having regard to STCW 95, masters ought not to operate with the officer of the navigational watch acting as sole look-out during periods of darkness and restricted visibility.

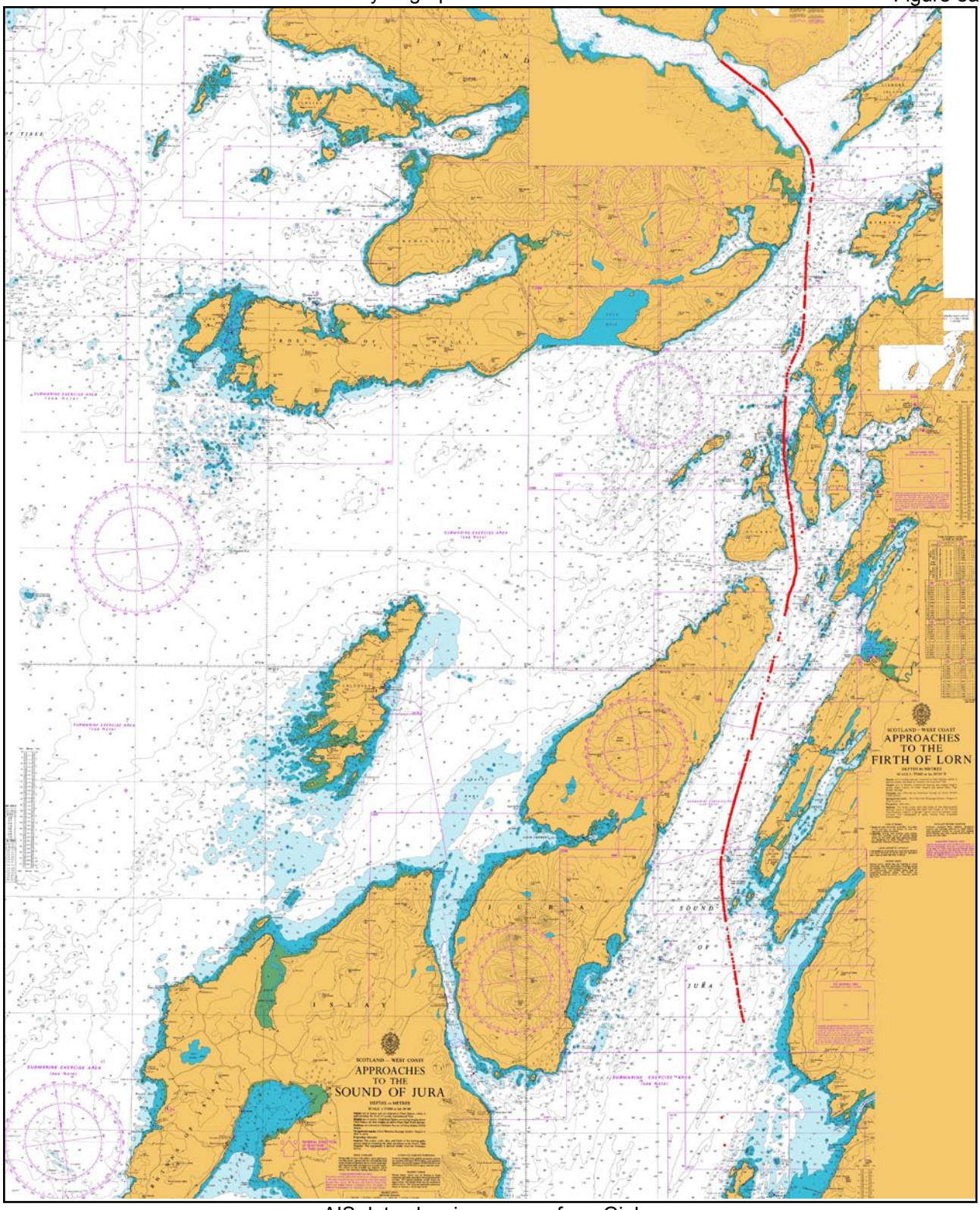
1.11 RECORDED DATA

AIS data recorded by the MCA was obtained by the MAIB, and the position and time data from this was entered into a Geographic Information System (GIS). This was then superimposed over charts of the area, and used to recreate the movements of *Aqua-boy* **(Figures 8a, 8b)**. From this data, a more precise time for the grounding was obtained – 0112.

Aqua-boy was not required to be fitted with, and did not have a Voyage Data Recorder. However, position and time data was recovered from the logbook facility of the ECDIS. The logbook stored the position, course and speed of the vessel at 90 minute intervals, and also recorded the times that the vessel passed its waypoints **(Figure 9)**. It was possible to display the approximate past track of the vessel from this logged data as a series of lines joining the stored positions.

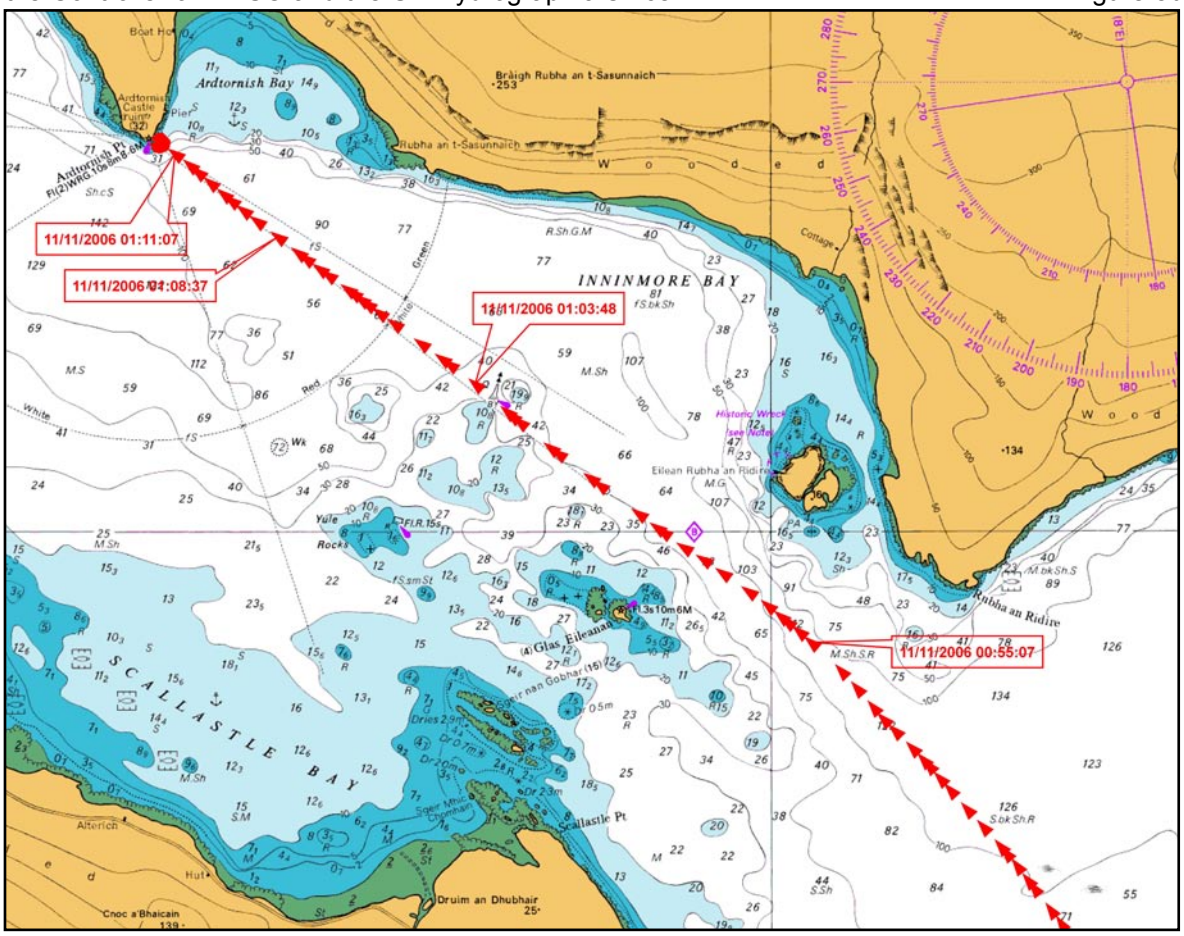
Both sets of data indicate that the vessel passed very close to the Inninmore Bay Buoy, some 10 minutes before the grounding. The condition of the buoy was checked by the Northern Lighthouse Board in the week following the grounding, but no damage was found.

Figure 8a



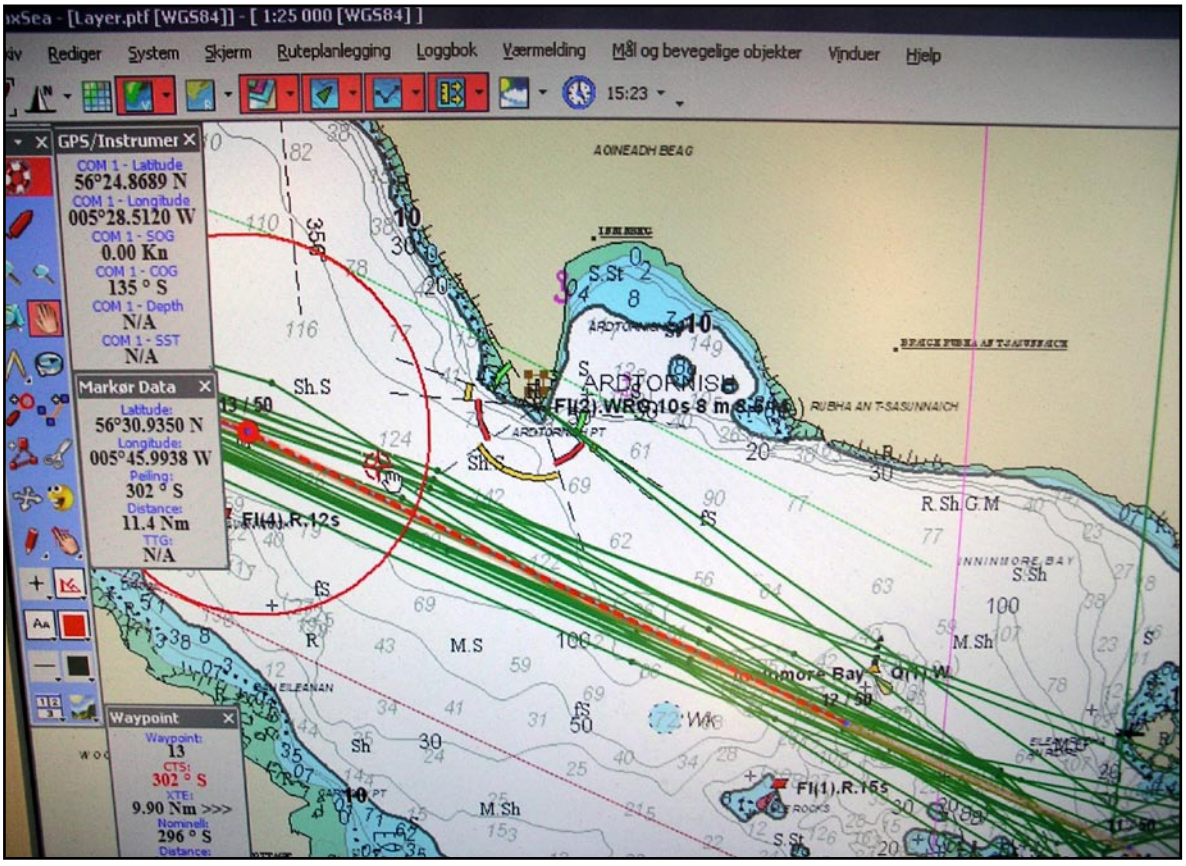
AIS data showing voyage from Gigha

Figure 8b



AIS data showing voyage through the Sound of Mull

Figure 9



ECDIS logbook

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

Aqua-boy grounded following the master's failure to take avoiding action on account of his having fallen asleep and then remaining asleep on watch. This analysis explores the factors that contributed to his falling asleep and to the fact that he was able to remain asleep without human or mechanical intervention.

2.2 FATIGUE

2.2.1 Work pattern

The normal working routine on board the vessel should have been 6 hours on, and 6 hours off, which would have allowed the watchkeepers to get adequate rest had the routine been maintained. However, when the routine is disrupted by port visits and the working of the vessel, fatigue very soon sets in. Part of the problem is that the change from watches at sea to nights alongside can exacerbate fatigue. In this case, the vessel's routine demanded changes from sea watchkeeping to nights alongside as a regular part of the operational cycle. The master's fatigue levels were increased by his insistence that he carried out the loading and discharge of the cargo, and the transits of the Caledonian Canal.

No record of the master's hours of rest was available. However, he had been able to get only 5 hours sleep the previous night and had been awake for 19 of the 24 hours preceding the accident. The conditions during that period were not so demanding as to warrant his continuous presence on the bridge. He had worked with the mate for 9 weeks and seemed to have every confidence in the mate's ability. The master did not feel under special pressure from the company. He did, however, have considerable pride in his record (never having 'lost a single fish') and a very conscientious approach to his job seems to be the only available explanation for his desire to take on an excessive workload.

His hours of rest did not meet the statutory minimum, and the generally irregular pattern of his rest periods would have increased the rate at which fatigue developed.

2.2.2 Food intake

The master ate very sparingly on the day before the accident, having had breakfast consisting mainly of coffee, a light meal at lunchtime, and then despite offers from the mate to bring him food, nothing to eat in the evening. This would have lowered the master's blood sugar level which, in turn, would have adversely affected his ability to concentrate.

2.2.3 Environmental effects

On a vessel of this size, the sea state and swell can have an adverse effect on the quality of the sleep possible. Rolling and pitching cause crew members to suffer from poor quality sleep, thereby increasing fatigue levels.

On leaving Gigha, with the wind from the southwest at force 7-8, the vessel would have pitched and rolled significantly. However, once past Lady Rock and the vessel having entered the Sound Of Mull, the lee provided by the island would have markedly reduced the sea state. The comparative calm meant that there was now no longer a need to brace against the ship's movement, and the master would have relaxed. He was in familiar waters, conducting a passage that he had made many times before, it was dark and there was no other traffic to concern him. It was warm on the bridge, and it was getting towards the end of his watch. He was sitting in a comfortable chair, and had no reason to move to carry out his navigational functions. The effect of this, combined with the master's already fatigued state, was enough to cause him to fall asleep.

2.2.4 Summary

Aqua-boy's working routine and environment generated a potential for fatigue to become an issue on board the vessel. In choosing to work more hours than were necessary, and restricting his intake of food, the master exacerbated his level of fatigue without taking full account of the probable consequences. His failure might have been due, at least in part, to the fact that it is difficult for an individual to recognize the symptoms of fatigue within him/herself, because fatigue impairs judgment, as promulgated in IMO MSC/Circ 1014 (Guidance on fatigue mitigation and management).

2.3 WATCHKEEPING

2.3.1 Lookout

Despite the requirement of the STCW code section A-VIII/2 part 3.1, the master was alone on the bridge at night. The code is not explicit in the requirement for an additional member of the watch at night, stating that *the officer in charge of the navigational watch may be the sole lookout in daylight.* The implication is that there must be an additional lookout by night. This is reinforced in MGN 137 (M+F) and MGN 315(M).

MGN 137(M+F) reminds operators and masters that all UK ships, wherever they may be, and other ships in UK territorial waters, are strongly advised not to operate with the officer of the navigational watch acting as the sole lookout during periods of darkness. It also states that an additional lookout should also be posted at any other time during restricted visibility or when the prevailing circumstances indicate such action is in the interests of safety.

MGN 315(M) reminds masters, owners and operators that the UK Maritime and Coastguard Agency considers it dangerous and irresponsible for the Officer of the Watch to act as sole lookout during periods of darkness or restricted visibility.

While the additional lookout would not have mitigated the master's fatigue, it is likely that another person on the bridge would have kept the master awake, or at least woken him if he had fallen asleep.

2.3.2 Watch alarm

Although a watch alarm was fitted, the alarm system was turned off at the time of the accident. In the absence of an additional lookout, a working watch alarm would have had the potential of waking the master as well as alerting the remaining crew.

2.4 SIMILAR ACCIDENTS

A review of the MAIB database of accidents was carried out to investigate the number of groundings of similar sized vessels under similar circumstances. The search was limited to vessels of between 100gt and 3000gt. Of the 46 groundings of vessels of this size investigated by the MAIB between 1991 and 2006, 32 groundings occurred in darkness or semi-darkness and, in 19 of these, the watchkeeper was asleep. Twenty four of the 46 groundings investigated on this size of vessel involved a watchkeeper alone on the bridge.

These statistics highlight high risk factors for groundings, including: navigation at night; lone watchkeepers on the bridge; vessels manned with only two watchkeepers; and fatigue due to the working pattern of the ship. At the time of the accident, *Aqua-boy* was operating with the master alone on the bridge, on a two watch system, at night, when fatigued due to his insistence on working more hours than were necessary.

2.5 MINIMUM SAFE MANNING

The vessel was operating with a crew of three, instead of the minimum safe manning level of four. She was therefore undermanned at the time of the accident.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

- The master's hours of rest did not meet the statutory minimum. [2.2.1]

3.2 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE NOT RESULTED IN RECOMMENDATIONS BUT HAVE BEEN ADDRESSED

- In choosing to work more hours than were necessary and restricting his intake of food, the master exacerbated his level of fatigue without taking full account of the probable consequences. [2.2.1, 2.2.2]

- Although a watch alarm was fitted, the alarm system was turned off. [2.3]

- No lookout was posted, so the master was alone on watch. [2.3]

- The vessel was operating below her minimum safe manning level. [2.4]

SECTION 4 - ACTION TAKEN

4.1 MCA

- Both the owner and master have been interviewed by an MCA enforcement officer.
- Formal cautions have been issued with regard to the manning levels on board *Aqua-boy*.
- Advice concerning safe operation of the vessel has been given to the owner.

4.2 Aqua Ship ANS

- MGNs issued by the MCA have been placed on board *Aqua-boy*.
- Formal instructions have been issued to the master and watchkeepers regarding use of the watch alarm.
- A requirement for both the master and mate to load and unload fish cargoes has been implemented.
- Formal instructions have been issued to the master regarding the requirement to have a lookout on the bridge at night, and at any other time as required.

SECTION 5 - RECOMMENDATIONS

Aqua Ship ANS is recommended to:

2007/160 Provide formal instructions to the master of *Aqua-boy* which will require him/her to keep the vessel alongside a safe berth if it becomes apparent that the statutory minimum hours of rest requirements are not likely to be achieved.

Marine Accident Investigation Branch
July 2007