Report on the investigation of

the grounding of

Antari

Near Larne, Northern Ireland

29 June 2008

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton
United Kingdom

Report No 7/2009
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Pursuant to the International Maritime Organization's "Code for the investigation of Marine Casualties and Incidents", the UK Marine Accident Investigation Branch (MAIB) has co-operated with the Antigua and Barbuda administration during the course of this investigation.

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.

Cover photograph courtesy of Mandy Johnston

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able Bodied seaman
AIS	-	Automatic Identification System
DfT	-	Department for Transport
DOC	-	Document of Compliance
DPA	-	Designated Person Ashore
DSC	-	Digital Selective Calling on VHF radio
ECDIS	-	Electronic Chart Display and Information System
ETA	-	Estimated Time of Arrival
GL	-	Germanischer Lloyd
ILO	-	International Labour Organization
IMO	-	International Maritime Organization
ISM	-	International Safety Management (Code)
kW	-	Kilowatt
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine guidance note
MSMC	-	Minimum Safe Manning Certificate
OOW	-	Officer of the Watch
SMS	-	Safety Management System
SOLAS	-	International Convention for the Safety of Life at Sea 1974, as amended
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended
UTC	-	Universal Time Co-ordinated
VDR	-	Voyage Data Recorder
VHF	-	Very High Frequency radio

Times: All times used in this report are UTC + 2 hours unless otherwise stated

Antari

SYNOPSIS

At 0321 on 29 June 2008 the general cargo vessel *Antari* grounded on the coast of Northern Ireland, while on passage from Corpach, Scotland to Ghent, Belgium. The officer of the watch had fallen asleep shortly after taking over the watch at midnight when the vessel was passing the peninsula of Kintyre (Scotland). With no-one awake on the bridge, the vessel continued on for over 3 hours, crossing the North Channel of the Irish Sea before grounding on a gently sloping beach about 7 miles north of Larne.

The chief officer, who was the watchkeeper at the time of the grounding, worked a 6 hours on/6 hours off watchkeeping regime with the master. As has been demonstrated in many previous accidents, such a routine on vessels engaged in near coastal trade poses a serious risk of cumulative fatigue.

Additional safety barriers which could have helped mitigate the risk posed by fatigue were not used: Despite the requirements of STCW, there was no lookout on the bridge throughout the night; and the watch alarm was not switched on. The company's SMS audits had failed to pick up that these important safety requirements were routinely not being applied.

Fatigue of bridge watchkeepers and lack of dedicated lookouts have long been identified as critical safety issues, particularly in vessels trading in near-coastal waters. However the UK has, to date, been unable to garner sufficient international support to introduce more robust standards. To ensure the safety of shipping within UK coastal waters and to protect the environment, it is therefore considered necessary for the UK to address these issues unilaterally.

The Department for Transport and the Maritime and Coastguard Agency have been recommended to:

- Press for an urgent review of the process and principles of safe manning at the IMO to reflect the critical safety issues of fatigue and the use of dedicated lookouts.

and in the interim:

- To instigate robust, unilateral measures to address the fatigue of bridge watchkeeping officers on vessels in UK waters and to ensure that a dedicated lookout is always posted at night, during restricted visibility and as otherwise required in hazardous navigational situations.

A recommendation has also been made to the owner of *Antari* designed to improve its ISM auditing procedures to ensure: the use of lookouts and watch alarms; compliance with hours of rest regulations; and effective passage planning.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *ANTARI* AND ACCIDENT

Vessel details

Registered owner	:	Briese Schiffahrts GmbH & Co
Port of registry	:	St John's, Antigua
Flag	:	Antigua and Barbuda
Type	:	General cargo vessel
Built	:	1997, Komarno, Slovakia
Classification society	:	Germanischer Lloyd
Construction	:	Steel
Length overall	:	87.9 metres
Gross tonnage	:	2446
Engine type and power	:	KHD Deutz SBV 8M 628 1500kW
Service speed	:	10.5 knots
Other relevant info	:	1 x bow thruster, 185kW

Accident details

Time and date	:	0333, 29 June 2008
Location of incident	:	Near Larne, Northern Ireland
Persons on board	:	7
Injuries/fatalities	:	0
Damage	:	Material damage to vessel's bottom over 70% length from forward.

1.2 NARRATIVE

At 1600 on 25 June 2008 the general cargo vessel *Antari* arrived in Belfast, carrying a cargo of rapemeal that had been loaded in Antwerp on 21 June.

The vessel sailed on completion of cargo operations, at 1605 on 26 June for Corpach, Scotland, where she arrived at 0715 the following day to load a cargo of scrap metal destined for Ghent, Belgium.

Cargo loading operations, using two shore cranes, began at 0900 and continued until 1900 when they ceased for the day. Loading resumed at 0900 on 28 June and was completed at 1300. A draught survey was then undertaken which showed that the vessel had loaded 2360 tonnes of scrap and that her draught was 3.80 metres forward and 5.10 metres aft.

Antari was ready to sail as soon as the required cargo and clearance documentation had been completed. However, her departure was delayed by approximately 1 hour to avoid a conflict with an organised swim, which was taking place across Loch Linnhe, close to the vessel's berth. The vessel sailed at 1520. The master, who had the conn, and the chief officer, who was the 12 to 6 watchkeeping officer, were on the bridge for departure.

The master remained on the bridge with the chief officer as the vessel passed close to the shoreline while proceeding down Loch Linnhe, towards the sea. The courses for the passage to Ghent had been entered into *Antari*'s electronic chart display and information system (ECDIS), but no written passage plan had been prepared and no discussion regarding the planned route had taken place between the master and chief officer.

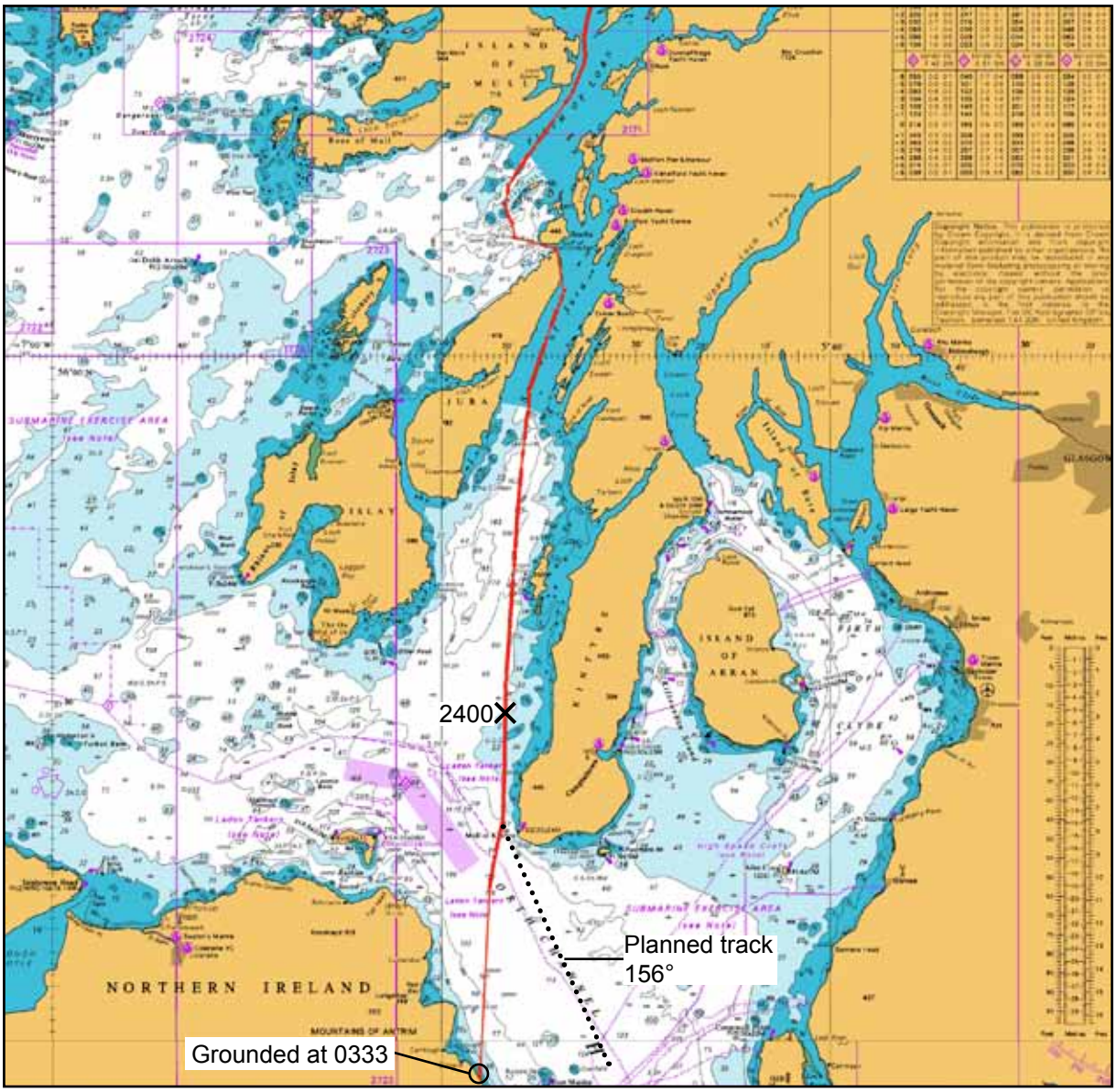
The master left the bridge at about 1630, returning to take over the watch at 1800. The chief officer then went below. At about 1900, the designated 12 to 4 watch Able Bodied seaman (AB), asked him if he would be required for lookout duties at midnight. The AB explained to the chief officer that he was tired because, for most of the day, he had been carrying out cargo related duties and fabric maintenance of the vessel. The chief officer confirmed that the AB would not be required for lookout duties on the 12 to 4 watch that night.

At 2000, with the master as the sole bridge watchkeeper, *Antari* transited the Gulf of Corryvrechan before heading south to run parallel with the west coast of the Kintyre peninsula **(Figure 1)**.

Sunset was at 2306, but the master did not post a lookout. At 2345 he called the chief officer and handed over the watch to him at midnight; he then went below to rest. The master considered that the chief officer was showing no outward signs of fatigue at that time.

Reproduced from Admiralty Chart BA 2724 by permission of
the Controller of HMSO and the UK Hydrographic Office

Figure 1



BA Chart 2724, extract showing *Antari*'s AIS track

At midnight, the vessel's course was 182° (T), speed 11 knots and she was about 11 miles from the next planned alteration of course position, which was due west of the Mull of Kintyre lighthouse.

The chief officer was now the sole bridge watchkeeper. Both wheelhouse doors were closed, it was a clear, moonless night and the sea was calm with a slight westerly swell. He was sitting, as was his custom, in a chair on the starboard side of the wheelhouse, in front of one of the radar sets and the ECDIS unit **(Figure 2)**. He fell asleep shortly after sitting down, and remained asleep until the vessel grounded at 0321.

Figure 2

Antari, wheelhouse chair in which chief officer fell asleep

The master was woken by the sound of the vessel taking the ground, and he went straight to the bridge. He found the chief officer awake, trying to assess what had happened.

The master stopped the engine, sounded the general alarm to muster the crew and noted that the vessel's autopilot was set to the same heading, 182º (T), which it had been when he had left the bridge at midnight. Once everyone on board had been accounted for, the master instructed the crew to take soundings of all the vessel's tanks and spaces and also had them check the depth of water around the vessel in accordance with procedures contained in the vessel's emergency manual.

At 0407 a motorist driving along the coast road between Larne and Glenarm reported to Belfast coastguard that he could see a vessel aground on the beach, close to the road at St Drumnagreagh Port **(Figure 3)**.

On receipt of this report the coastguard checked the Automatic Identification System (AIS) records and identified that the vessel was *Antari,* which was then called on VHF Digital Selective Calling (DSC), without reply.

Image courtesy of Mandy Johnston

Figure 3

Antari aground on the Antrim coast

At 0420 the coastguard contacted the Larne lifeboat, requested it to launch and proceed to the scene, and also instructed a coastguard rescue team to proceed to the area.

At 0427 the master of *Antari* contacted Belfast coastguard by VHF radio. He reported the grounding and advised that the vessel was apparently undamaged. Also at about this time, he advised the company's Designated Person Ashore (DPA) regarding the circumstances of the grounding.

The first members of the coastguard rescue team arrived on scene at 0445, and quickly established that there was no pollution on the beach.

The Larne lifeboat arrived at 0512 and carried out a check, by searchlight, of the vessel for damage and pollution **(Figure 4)**.

The vessel had grounded about 1 hour after low water, on a neap tide, and by 0539 the coastguard rescue team reported that the vessel's bow appeared to be moving slightly. On board *Antari*, the master also detected that the vessel was starting to move, and placed the engine on standby. At 0611 the engine was put astern. The vessel immediately began to move, and she refloated at 0612.

Image courtesy of Mandy Johnston

Figure 4

Larne lifeboat checks *Antari*'s hull for damage

Once *Antari* was afloat, the master informed the coastguard and arranged for further soundings of the tanks and spaces to be carried out to confirm the vessel's watertight integrity.

At 0630 the master informed the coastguard that there was no evidence of leaks in any of the vessel's tanks, and requested permission to resume passage to Ghent. During this conversation, the coastguard asked the master what had caused the grounding, and was informed that the chief officer had fallen asleep.

The vessel was subsequently instructed by the Maritime and Coastguard Agency (MCA) to proceed towards Belfast, to facilitate an underwater inspection and survey of her hull. She anchored off Bangor, Northern Ireland at 0915.

1.3 SURVEY AND SUBSEQUENT REPAIRS

On 30 June, *Antari* was still at anchor off Bangor when representatives from the owners, the vessel's classification society Germanischer Lloyd (GL), Flag State and the MCA boarded and a divers' survey of the hull was undertaken.

The results of the survey showed indentation damage to the bottom of the hull over 70% of the vessel's length from forward, and found that there was a small hole in number 3 double bottom ballast tank.

As a result of the damage, GL suspended the vessel's safety construction certificate and issued an interim, conditional, certificate to enable her to proceed on passage to Ghent.

An MCA surveyor carried out a Port State Control inspection and reported three deficiencies, one of which was that the watchkeeping arrangements for the crew were not in accordance with the vessel's watchkeeping plan, as stated in the owner's safety management system, because an AB was not on watch as indicated in the plan.

The vessel departed for Ghent later that day, where she arrived on 3 July. On completion of discharge of the cargo, she proceeded to Swinoujscie, Poland where permanent repairs, lasting several weeks and requiring 25 tonnes of new steelwork to the vessel's bottom **(Figure 5)**, were carried out before she was able to resume service.

Figure 5

Damage to bottom

1.4 BRIDGE WATCHKEEPING OFFICERS

The two bridge watchkeeping officers on board *Antari* at the time of the accident were*:*

1.4.1 Master

The master held a Russian certificate of competency permitting him to sail in the capacity of master on vessels of less than 3000gt.

He was experienced on vessels of a similar size to *Antari*, and had been promoted to master in 1993. He had worked on board *Antari* since she was new and, in order to remain with the vessel, accepted employment from Briese Schiffahrts GmbH (Briese Schiffahrts) when the company purchased *Antari* in 2002.

He worked 4 months on board, followed by 4 months leave, and had rejoined the vessel on 12 March 2008.

In accordance with Briese Schiffahrts' safety management system (SMS) **(Annex A)** the master's duties at sea, in addition to being the 6 to 12 bridge watchkeeper were: to be on the bridge for entering and leaving port; to monitor the actions of the pilot; to keep the ship's agents advised on estimated times of arrivals (ETAs); to order pilot, tugs, locks etc; and to liaise with the chief engineer and the company's operations department regarding bunker stocks. In addition, he was required to be on the bridge during restricted visibility and when required by the navigational situation.

In port, the master was required to organise the harbour watch, co-ordinate cargo operations with the chief officer, undertake port clearance formalities, arrange for the disposal of garbage, and keep the garbage record book updated. He was also required to ensure that stores received were properly checked and any deficiencies reported to the company.

1.4.2 Chief officer

The chief officer held a Russian certificate of competency which permitted him to sail as chief officer or engineer on vessels of similar size to *Antari*.

He worked 4 months on, 4 months off, and had first joined *Antari* in 2007, when he was promoted to chief officer. He was on his third tour of duty, having joined on 12 March 2008, at the same time as the master and the rest of the 7-man crew.

His duties in port were: to supervise cargo operations; monitor draught, trim, stability, structure and stresses; ensure the nautical charts were kept updated; and plan and document the next voyage in accordance with company

requirements. If the vessel was not working cargo, the chief officer was still required to be available during the 12 to 6 watch if needed by the AB on gangway security watch.

At sea, in addition to the duties of the 12 to 6 bridge watchkeeping officer, he was responsible for anchoring and for ballasting operations in liaison with the chief engineer.

When *Antari* was in Corpach on 27-28 June, no cargo operations were undertaken between 1900 and 0900. The chief officer watched television and read during the evening of 27 June, and spent 2 hours in the wheelhouse after midnight, doing chart corrections. He was in bed between 0230 and 0600.

1.5 WATCH PATTERNS

The master and chief officer were the vessel's bridge watchkeeping officers, and worked 6 hours on/6 hours off in accordance with the vessel's watchkeeping plan **(Annex B)**.

The watchkeeping plan listed the designated watches for which the crew were assigned to be on duty in addition to the watchkeeping officer. The plan was endorsed to the effect that, when *Antari* was at sea, the crew on duty would be on watch in cases of emergency, bad visibility, night time, and if otherwise necessary.

1.6 HOURS OF WORK AND REST

Antari's trading pattern for May and June 2008 **(Annex C)** shows that she made 21 port calls in the 8 weeks preceding the accident.

The hours of rest records for the master and chief officer **(Annex D)** show that, on some days during May and June 2008, they were not achieving the hours of rest necessary to meet the requirements of the International Labour Organization (ILO) convention 180, in accordance with circular 01-002-04 issued by the Department of Marine Services and Merchant Shipping, Antigua and Barbuda.

The hours of rest records also reveal that both the master and chief officer were recording, in advance, their watches as work time, regardless of whether they were actually working or resting.

Similarly, the hours of rest records for the AB, who the chief officer had excused from standing the midnight to 0400 watch, show him to be on watch at the time of the grounding.

In accordance with the requirements of EC Directive 1999/95/EC, all ships trading in EU waters must comply with ILO convention 180 with regard to hours of work and rest for all seafarers. Article 5 of the convention includes:

1. *The limits on hours of work and rest shall be as follows:*

   (a) maximum hours of work shall not exceed:

   (i) 14 hours in any 24 hour period; and

   (ii) 72 hours in any seven-day period;

or

   (b) minimum hours of rest shall not be less than:

   (i) 10 hours in any 24-hour period; and

   (ii) 77 hours in any seven-day period.

2. *Hours of rest may be divided into no more than two periods, one of which shall be at least six hours in length, and the interval between consecutive periods of rest shall not exceed 14 hours.*

Similar, but less stringent requirements regarding minimum hours of rest are contained in Section A-VIII/1 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended (STCW).

1.7 LOOKOUT

1.7.1 Company requirements

Section 7.2.3 of the company's SMS procedures **(Annex A)** required that for:

'*The ship at sea'* the officer of the watch was required to call a lookout to the bridge '*during hours of darkness*'.

This was reiterated by the Designated Person Ashore (DPA) in a letter sent to all vessels on 18 January 2008 **(Annex E)**.

The letter listed topics of non conformance, identified by internal and external ISM audits carried out on the company's vessels during 2007.

One of these topics related to lookout:

"Lookout: *Please keep in mind, that there has to be a lookout during hours of darkness on the bridge. This also compulsory during bad visibility, difficult navigational areas, high traffic density and during river passages and/or entering/leaving ports." (*sic)

1.7.2 STCW requirements

The provisions of the STCW address watchkeeping at sea and set out certain principles to be observed when keeping a navigational watch, including the keeping of a lookout. Relevant parts of the text read as follows:

STCW Section A-VIII/2.15

The duties of the lookout and helmsperson are separate and the helmsperson shall not be considered to be the lookout while steering, except in small ships where an unobstructed all-round view is provided

at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper lookout. The officer in charge of the navigational watch may be the sole lookout in daylight provided that on each such 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, including, but not limited to:

- state of weather

- visibility

- traffic density

- proximity of dangers to navigation

- 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.

1.7.3 Flag State requirements

The Antigua and Barbuda Department of Marine Services and Merchant Shipping issued circular 01-002-98 regarding the use of a lookout during periods of darkness, which states:

'*As Antigua and Barbuda is a signatory to the International Convention on Standards for Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended in 1995, the Department of Marine Services and Merchant Shipping wish to draw company's, masters' and officers' attention to Section A-VIII/2.15 of the STCW-Code following to which "ships are prohibited from operating with the officer of the navigational watch as the sole look-out during periods of darkness".*

This provision does apply to all trading areas!'

1.7.4 Maritime and Coastguard Agency (MCA) requirements

The following advice has been issued by the MCA:

MSN1767(M) section 3, paragraph 21.2 states that:

'*the UK does not consider it safe for the officer of a navigational watch to act as the sole lookout during periods of darkness or restricted visibility*'

MGN 137 (M&F) contains the following:

Masters of UK ships and other ships when in UK waters (other than fishing vessels and pleasure craft) are also reminded of the requirements in the Merchant Shipping (Safe Manning, Hours of Work and

Watchkeeping) Regulations 1997. These requirements are to ensure that the watchkeeping arrangements for the ship are at all times adequate for maintaining safe navigational watches, having regard to the STCW Code section A-VIII, and to give directions to deck watchkeeping officers in accordance with Part 3 of that section. Having regard to STCW 95, masters ought not to operate with the officer of the navigational watch acting as sole lookout during periods of darkness and restricted visibility.

MGN 315(M) gives guidance on the application of the STCW. It contains specific advice on the keeping of a lookout **(Annex F)**.

1.8 WATCH ALARM

A watch alarm is an alarm system that is designed to alert the watchkeeper at predetermined intervals. The alarm sequence will usually consist of a flashing light, followed, after a period of time, by an audible alarm on the bridge, and thereafter, following a further delay, by the sounding of an alarm in the officers' cabins, or the general alarm. Once activated, the initial alarm is usually silenced by the watchkeeper pressing a button. Failure to cancel the alarm will result in the off watch officer(s) or, in some cases, the entire crew, being alerted to a potential problem on the bridge.

A watch alarm was fitted on *Antari* **(Figure 6)**, but was not used because the bridge watchkeeping officers were concerned that off duty personnel would be disturbed if it activated on the repeater units fitted in the officers' accommodation **(Figure 7)**.

In November 2000, following a grounding, the owners of *Antari* issued a standing order **(Annex G)** to remind masters that the watch alarm must be in use during sea watches. The alarm was not in use at the time of the accident.

1.9 SAFETY MANAGEMENT SYSTEM (SMS)

The company's SMS was audited and approved by GL on behalf of the Flag State on 15 August 2005 when the Document of Compliance (DOC) was issued. The DOC was verified with annual checks made on 16 October 2006 and 15 October 2007.

An external audit of *Antari*'s SMS was carried out by GL on 18 May 2007, and annual internal audits of the vessel were carried out by a specialist audit company on behalf of the owner; the most recent occurring on 28 May 2008.

To promote the SMS, the company holds four senior officer seminars per annum, when masters and senior chief officers visit the office to discuss operational and company related matters. Masters and chief officers also visit the company's offices before joining their vessels to meet the relevant superintendents and to be given familiarisation on the vessels and trade.

Figure 6

Watch alarm in wheelhouse

Figure 7

Watch alarm repeater in master's cabin

The DPA issues an annual information letter to all vessels in the fleet. This details the results of the company's external audit and summarises the results of the internal and external audits carried out on the vessels during the preceding 12 months, highlighting items of particular concern or interest. The summary of the 2007 audits that were undertaken was issued on 18 January 2008 **(Annex E)**.

From May 2007, Briese Schiffahrts introduced a newsletter which is sent to the fleet on a quarterly basis. The purpose of the newsletter is to keep staff informed about relevant news as well as provide information on lessons learned from recent accidents and/or new legislation that might impact on the company or its fleet.

The newsletter also includes an ISM section detailing the results of internal and external audits on company vessels, and lists common deficiencies as well as highlighting vessels which have performed well and are well maintained.

1.10 MINIMUM SAFE MANNING CERTIFICATE (MSMC)

Antari's MSMC **(Annex H)** was issued by the Antigua and Barbuda administration on 18 January 2008.

It specified that a minimum of six crew were required for the vessel, consisting: master, chief officer, chief engineer, two ratings forming part of a navigational watch and one deck rating.

Antari had a complement of seven at the time of the accident. She met the requirements of her MSMC and, in addition, carried a cadet.

Annex C of MSN 1767 (M) **(Annex I)** provides an indication of the manning levels required for vessels under the UK flag. For a vessel of *Antari*'s tonnage, engaged in the near coastal trade, the requirement for deck officers is a master plus a chief officer. The same vessel would be required to be manned with an additional watchkeeping officer when engaged in unlimited trading.

1.11 ENVIRONMENTAL CONDITIONS

At the time of the accident, the wind was westerly 15 knots, the visibility was good and the weather was clear. There was a low westerly swell.

Sunset was at 2306 on 28 June and moonrise at 0222 on 29 June.

1.11.1 Tidal conditions

Low water (Larne) 0227 0.8m

High water (Larne) 0837 2.6m

Neap tides.

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.

2.2 FATIGUE

It is probable that the chief officer fell asleep shortly after taking over the watch at midnight, and then remained asleep for more than 3 hours until the vessel grounded.

Analysis of the chief officer's sleep pattern indicated that there was a high risk that he was fatigued.

In the 24 hours preceding the grounding, his sleep pattern had been disturbed by the port call and cargo operations in Corpach and, although he had the opportunity to rest, his circadian rhythm was probably sufficiently disrupted to prevent him obtaining adequate rest during this period. This was a typical scenario for a vessel engaged in short sea trading with frequent calls in port.

The effects of fatigue include slow reactions, slips and lapses in decision making and, in a quiet and comfortable environment, can lead to an increased risk of napping. The decision to inform the lookout, several hours before midnight, that he would not be required for the midnight to 4 watch, was a lack of judgment which can, in part, be attributed to fatigue.

When the chief officer took over the watch at midnight, it was a warm night, the vessel was in calm waters and both bridge doors were closed. The atmosphere on the bridge would have been very quiet, and once he sat in the chair, with no lookout posted and the watch alarm turned off, there were no means of anyone knowing that the chief officer had fallen asleep.

2.3 *ANTARI*'S SCHEDULE, MAY AND JUNE 2008

Antari was trading around the north west coast of Europe **(Annex C)** and had made 21 port calls in the 2 months preceding the accident. Every port call required the master's and chief officer's intense involvement: preparations for arrival and departure, pilotage, supervision of cargo operations, official and cargo paperwork. Audits and statutory inspections are normally undertaken in port, and these additional demands cannot normally be contained within the 6 hours on/6 hours off watch pattern since they frequently occur during what would otherwise be regarded as rest periods.

This intensive pattern, typical of the short sea shipping trade, is likely to contribute to the cumulative fatigue levels of individuals working 6 hours on/ 6 hours off, the longer they spend on board, and, in this case, probably prevented the chief officer from obtaining adequate rest.

2.4 SIMILAR ACCIDENTS

2.4.1 MAIB Bridge Watchkeeping Study[1]

In 2003, the Chief Inspector of Marine Accidents commissioned the Bridge Watchkeeping Study after a series of remarkably similar accidents. The study analysed accidents involving merchant vessels >500gt, underway and without a pilot, which had been the subject of either a Full Investigation or a Preliminary Examination between 1994 and 2003.

Initially a review of the data identified three principal areas of concern:

- *A third of all groundings involved a fatigued officer alone on the bridge at night.*
- *Two thirds of vessels involved in collisions were not keeping a proper lookout.*
- *A third of all accidents that occurred at night involved a sole watchkeeper on the bridge.*

An analysis of the data for 23 vessels involved in grounding incidents shows a striking resemblance to that of *Antari*:

- Nearly 50% (11 cases) occurred between 0000 and 0600, of which fatigue was considered a contributory factor in 9 of the cases.
- In eight of the nine fatigue related accidents, the vessels:
  - Carried only two watchkeeping officers
  - Had not posted a lookout
  - Were steering by autopilot
  - Were not fitted with, or were not using a watch alarm
  - Had an unaccompanied watchkeeper who had fallen asleep.

The study collated the underlying human factors involved in the accidents and considered the commercial and operational pressures placed on the crews of vessels trading in North West European waters.

It concluded that varying voyage lengths and operational demands prevent individuals working 6 hours on/6 hours off being able to enjoy uninterrupted periods of rest due to continual disruptions to sleep patterns and to their circadian rhythms. This, in turn, can lead to the accumulation of fatigue the longer the individuals are subject to this regime.

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[1] Published by the MAIB July 2004
http://www.maib.gov.uk/publications/safety_studies/bridge_watchkeeping_safety_study.cfm

2.4.2 Post-study accidents

Since 2004 the MAIB has investigated nine other grounding accidents, involving vessels of a similar size to *Antari,* in which strikingly similar contributory factors were identified:

- Lone bridge watchkeeping officer, (in six of the accidents the lone watchkeeping officer fell asleep)
- No lookout posted
- No watch alarm
- Cumulative effects of fatigue. (In seven of the nine accidents, the watchkeeping officer who fell asleep or made a fatigue-induced error had been working 6 hours on 6 hours off for at least 3.5 months.)

2.5 MINIMUM SAFE MANNING CERTIFICATE

Antari exceeded the requirements of her MSMC, which required a complement of six persons, as a cadet was carried in addition to the requisite crew. However, in practice, the cadet was not involved in watchkeeping and was effectively an extra AB, used, in general on fabric maintenance.

In 1999 the International Maritime Organization (IMO) adopted resolution A.890(21), Principles of Safe Manning, as amended by A.995(23), which recommended that Flag States followed defined principles when establishing the minimum safe manning levels for vessels over 500gt. Flag States can thus use their discretion when deciding on appropriate minimum manning levels for their vessels.

The fact that accidents in which the fatigue of lone watchkeepers is a contributory factor, continue to occur, suggests that the existing discretionary situation is not sufficiently robust to prevent similar accidents occurring in the future.

The principles to follow when establishing a vessel's minimum safe manning level need to be consistently applied by all Flag States. The process should make a realistic assessment of the workload placed on watchkeeping officers, taking into account the individual's probable additional non-watchkeeping duties, particularly for those operating on near coastal trades.

It is interesting to note that if *Antari* had been registered in the United Kingdom, the minimum number of bridge watchkeepers required would also have been two when the vessel was trading in near-coastal waters. However, an additional Officer of the Watch (OOW) would be required if the vessel's trading area was unlimited.

It is difficult to reconcile the logic which is applied by many flag administrations which require fewer watchkeepers to be carried on a vessel trading in near coastal waters, than when she has an unlimited trading area, which inevitably results in her spending longer periods at sea.

On near coastal voyages, with frequent port calls, the watchkeeper will experience broken rest periods, and frequent disruption to circadian rhythms which can lead to the accumulation of fatigue. On longer voyages, watchkeepers are more likely to be able to have uninterrupted cycles of work and rest resulting in improved levels of performance and alertness, especially during the night-time watches.

This, and other similar accidents (see 2.4 above) appears to indicate a compelling need for an additional watchkeeping officer on vessels such as *Antari* and that, unless an international mandatory process with sufficiently robust assessment criteria for determining safe manning is introduced, merchant vessels over 500gt should, in general, be manned with a minimum of a master plus two bridge watchkeeping officers.

2.6 LOOKOUT

2.6.1 Use of lookouts

The master was alone on the bridge for the 1800 to midnight watch, which included the passage through the confined waters of the Gulf of Corryvrechan. He did not call a lookout to the bridge, either at sunset or for the chief officer's watch at midnight.

The chief officer's decision not to use a lookout was a contributory factor to the accident, and was probably due to complacency underpinned by long term routine and the cumulative effects of fatigue.

The master should have posted a lookout from sunset, and it would also have been prudent, in accordance with STCW Section A – VIII/2.15, to have had a lookout on the bridge earlier in his watch during the passage through the confined waters of the Gulf of Corryvrechan.

Lookouts were not routinely used on board *Antari* as the master prioritised other tasks, including fabric maintenance, over the need to post a lookout.

2.6.2 Requirement

The requirement for maintaining a lookout is widely promulgated[2], officially by regulation, and additionally by industry bodies. The requirement to have a lookout posted in addition to the watchkeeping officer was also included in the company's SMS documentation carried on board *Antari.* This had been reiterated in an information letter, issued to the fleet on 18 January 2008 **(Annex E)**.

[2] STCW, Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations 1996

It has been the experience of MAIB that application of the requirement for posting a lookout by day and night, although well understood by bridge watchkeeping officers, all too frequently falls short of the minimum standards expected for the purposes of safe navigation.

Mariners have sufficient advice and legal requirements regarding the need to maintain a proper lookout. The emphasis should become such that a lookout is posted on the bridge at all times, and should be an integral part of the bridge team, as promoted in MGN 315 (M). It would be appropriate, in view of the continuation of accidents in which no lookout is present, that this issue is promoted internationally, and that a greater emphasis is placed on verifying compliance during audits and inspections.

2.7 HOURS OF WORK AND REST RECORDS

The hours of work and rest records for the master, chief officer and the 12 to 4 AB on *Antari* were found to be inaccurate. Rather than use blank forms, these were pre-filled to reflect the expected working hours based on the individual's watch pattern. The forms were not subsequently amended to record the actual hours of work/rest.

The master's records show that he worked the 6 to 12 watch regardless of whether or not he was actually working. In the case of the chief officer, the record shows that he was working between midnight and 0600 on 28 June, when it is known that he was sleeping from 0200 until about 0700. Thus, they do not accurately reflect the change of routine experienced in port.

The records for the AB, who should have been on lookout duty at the time of the grounding, show that he was on watch during the period, when it is known that he had been stood down.

The fact that such discrepancies exist calls into question the veracity of the records for other members of the crew.

The practice of completing work/rest records inaccurately should continue to be actively discouraged by the vessel's owners. Moreover, routine careful scrutiny of these records and comparison with the vessel's logbooks and other records, during internal audits and inspections, should be employed to ensure work/rest records are being completed in an appropriate manner.

2.8 ACTIONS FOLLOWING THE GROUNDING

The master, awoken by the sounds and vibration of the vessel grounding, went straight to the bridge. His initial actions were effective in stopping the engine, mustering the crew and assessing the condition of the vessel.

However, the master did not inform the coastguard of the accident until almost an hour after the vessel had grounded, when the vessel, identified from AIS records, had already been called by the coastguard on VHF, DSC.

The failure to immediately inform the Coastal State of the grounding was contrary to international maritime rules[3] and to the company's own SMS instructions. An immediate report is important because it gives the Coastal State the maximum time in which to arrange for assistance to the vessel and her crew, and to put in place contingency plans for both salvage and the prevention of pollution.

In this case, thanks to the vigilance of a member of the public and the effective actions of the Belfast coastguard, a lifeboat and an initial response team from the local coastguard were already en route to *Antari* by the time the master reported the grounding.

2.9 WATCH ALARM

Although, at the time of the accident, there was no international legal requirement for a watch alarm to be fitted to vessels, one was fitted on *Antari* and was tested weekly to ensure it remained operational.

However, the alarm was not routinely used, because the perceived need to avoid disturbing off duty watchkeepers had become a priority over providing the safeguard of alerting other crew members in the event of a sole watchkeeper becoming incapacitated or falling asleep.

It was not switched on at the time of the grounding, which was a contributory factor to the accident. If the watch alarm had been switched on, it would probably have woken the chief officer on the bridge and, if not, should have woken the master, via the repeater alarm in his cabin, thus enabling action to be taken to prevent the grounding.

The practice of not using the watch alarm had become established on board, despite the requirements of the company's standing orders. This was not detected during Briese Schiffahrts' internal SMS audits. The practice was probably compounded by complacency, underpinned by long term routine and the cumulative effects of fatigue.

If the bridge watch alarm was permanently linked to the autopilot, it would ensure that the alarm could not be switched off whenever the vessel was underway at sea. There may also be merit in connecting the watch alarm to vessels' Voyage Data Recorders (VDRs), to facilitate analysis of the routine use of the watch alarm during audits of vessels' SMSs.

2.10 PASSAGE PLANNING

Antari's passage from Corpach to Ghent took the vessel from Loch Linnhe through the Gulf of Corryvrechan, and into the Sound of Jura before entering the North Channel, from where the vessel should have proceeded into the Irish Sea.

[3] IMO MARPOL Protocol I

No passage planning discussion took place between the master and chief officer prior to commencing the voyage and, contrary to international requirements[4], the plan was not recorded. The vessel was delayed by an hour in sailing from Corpach, which presented an ideal opportunity to discuss and formally record the plan. There were no admiralty sailing directions (NP66) on board, for the west coast of Scotland, to assist in planning the passage through the confined waters at the start of the voyage, which also demonstrates that the level of planning necessary for such a passage had not taken place.

However, there was evidence that appropriate passage planning had been undertaken on previous voyages, and it is probable that, as the master and chief officer had been on board working 6 hours on/6 hours off for 3.5 months, this deficiency was again the result of complacency, underpinned by long term routine and the cumulative effects of fatigue.

2.11 SAFETY MANAGEMENT SYSTEM

Briese Schiffahrts operates a fleet of more than 80 vessels, and has an effective SMS. Instructions to vessels, contained in quality management manuals on board, are regularly updated, and the company undertakes regular audits of its vessels using both internal and external auditors to ensure SMS compliance. Specifically, in relation to the use of a lookout, the company's instruction to the vessels to ensure a lookout was used during the hours of darkness was clearly stated.

However, the audits carried out on *Antari* failed to identify that the watch alarm was not being used or that lookouts were not being routinely posted.

The publication of in-house newsletters is a recognised and effective way of communicating with vessels. However, there is a possibility that by featuring vessels which are found to be in an excellent fabric condition, the company may unwittingly influence the masters of vessels to prioritise fabric maintenance over the basic requirement of maintaining a safe navigational watch.

The standing order **(Annex G)**, instructing masters to use the watch alarm at sea, was not incorporated into the vessel's SMS manual, and did not therefore appear with the list of duties for individual officers to undertake when the vessel is at sea **(Annex A)**. The master and chief officer had both joined the company since 2000; if the requirement to use the watch alarm had been included in the SMS manual, this might have influenced the master to ensure that it was routinely used.

[4] IMO SOLAS Chapter V, Regulation 34.

The fact that a Port State Control inspection, carried out on 30 June, identified a deficiency with *Antari*'s watchkeeping arrangements, in that they did not comply with the vessel's watchkeeping plan, demonstrates that, even after the grounding, the master's priorities were still not on maintaining safe watches, but rather on maintaining the vessel.

2.12 SAFE MANNING LEVELS

Since the publication of the MAIB Bridge Watchkeeping Safety Study in 2004 [2.4.1] and as a result of MAIB recommendations made following more recent accidents, the Department for Transport (DfT) and the MCA have made proposals to the EU and IMO that sought to introduce more robust international requirements for determining the safe manning levels of vessels.

The purpose of these proposals was twofold:

- to reduce fatigue levels of watchkeeping officers by requiring, in general, a minimum manning requirement of a master plus two watchkeeping officers for vessels trading in near-coastal waters.
- to ensure that dedicated lookouts are always posted at night, during restricted visibility and as otherwise required in hazardous navigational situations.

However, to date, despite their best endeavours, DfT and MCA have not received sufficient international support to introduce more robust standards. The lack of progress in this area means that the possibility for similar accidents, with the potential for more serious consequences, recurring in UK territorial waters in the future remains high.

In the absence of international consensus on these issues, it would appear appropriate for UK maritime authorities to unilaterally impose targeted control measures on all vessels operating in UK waters. Such measures should clearly not seek to penalise ships' staff, but be designed to ensure ship operators provide the manning, resources and management oversight to remove the risk of fatigue and provide dedicated lookouts when required.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS[5]

1. The chief officer fell asleep, probably because he was fatigued. [2.2]

2. The chief officer's decision not to post a lookout was a lack of judgment which can, in part, be attributed to fatigue. [2.2]

3. The combination of a prolonged period of short sea trading involving frequent calls in port, with only the master and chief officer as bridge watchkeeping officers, probably prevented the chief officer from obtaining adequate rest. [2.3]

4. It is evident from this, and previous similar accidents, that the carriage of only two bridge watchkeeping officers on vessels engaged in near coastal trade poses an increasing risk of cumulative fatigue with time. [2.4]

5. This, and other similar accidents appears to indicate a compelling need for an additional watchkeeping officer on vessels such as *Antari*. [2.5]

6. Unless an international mandatory process, with sufficiently robust assessment criteria for determining safe manning is introduced, there is a compelling need for requiring merchant vessels over 500gt to, in general, have a minimum of a master plus two bridge watchkeeping officers. [2.5]

7. A lack of emphasis in STCW 95 in respect of the need to have a lookout on duty at all times, who should only be used for other duties in prescribed conditions, weakens the effect of any supplementary instruction and the priority given to posting a lookout over other tasks. [2.6]

8. The safety culture on board *Antari* was not sufficiently robust. This led to the master becoming complacent, accepting incorrect hours of work and rest records, prioritising fabric maintenance over posting lookouts, and allowing the watch alarm to be switched off, none of which had been identified by company audits, and therefore remained uncorrected by the company management. [2.6.1, 2.7, 2.9, 2.11]

9. As a result of the lack of progress by DfT and MCA at EU or IMO to introduce more robust standards with respect to manning levels and to ensure that a dedicated lookout is always posted at night, during restricted visibility and as otherwise required in hazardous navigational situations, unilateral action should be taken to prevent similar accidents recurring in UK waters in the future. [2.12]

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[5] Includes issues which relate to recommendation(s) yet to be developed- see Section 5.

3.2 OTHER SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION ALSO LEADING TO RECOMMENDATIONS

1. The master did not inform the Coastal State immediately after the grounding. [2.8]

2. No passage planning discussion took place between the master and chief officer prior to commencing the voyage, and the plan was not recorded. [2.10]

3.3 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE RESULTED IN ACTION BEING TAKEN

1. The watch alarm was switched off. [2.9]

SECTION 4 - ACTION TAKEN

4.1 Briese Schiffahrts GmbH & Co has:

1. Commissioned work to investigate the feasibility of linking the watch alarm with the autopilot on its vessels.

4.2 The MCA has:

1. Prepared a work programme paper for IMO to request the introduction of a mandatory process and a review of the principles for establishing the safe manning levels of ships with a view to making the provisions mandatory in SOLAS.

SECTION 5 - RECOMMENDATIONS

The **Department for Transport** and the **Maritime and Coastguard Agency** are recommended to:

2009/115 Press for an urgent review of the process and principles of safe manning at the IMO to reflect the critical safety issues of fatigue and the use of dedicated lookouts.

and in the interim:

2009/116 To instigate robust, unilateral measures to address the fatigue of bridge watchkeeping officers on vessels in UK waters and to ensure that a dedicated lookout is always posted at night, during restricted visibility and as otherwise required in hazardous navigational situations.

Briese Schiffahrts GmbH & Co is recommended to:

2009/117 Review and amend its safety management system to ensure its internal auditing policies verify the following:

- compliance with hours of rest regulations
- effective passage planning in accordance with SOLAS Chapter V, Regulation 34
- understanding of the requirements for notifying coastal states
- the appropriate use of lookouts and watch alarms at sea.

February 2009
Marine Accident Investigation Branch