Report on the investigation of

the grounding and loss of

the crabber

***Our Nicholas* (SY811)**

near the entrance to Stornoway Harbour

on 24 July 2001

Marine Accident Investigation Branch
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United Kingdom
SO15 2DZ

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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

CO_2	-	Carbon dioxide
COSPAS/ SARSAT	-	Search and Rescue Satellite System
DGPS	-	Differential Global Positioning System
EPIRB	-	Emergency Position Indicating Radio Beacon
GHz	-	gigahertz
GMDSS	-	Global Maritime Distress and Safety System
GPS	-	Global Positioning System
GRP	-	Glass Reinforced Plastic
HRU	-	Hydrostatic Release Unit
IMO	-	International Maritime Organization
Inmarsat	-	International Maritime Satellite
kW	-	kilowatt
LEOLUT	-	Low Earth Orbit Local User Terminal
MCA	-	Maritime and Coastguard Agency
MHz	-	megahertz
MRCC	-	Maritime Rescue Co-ordination Centre
Nm	-	newton metre
SOLAS	-	Safety of Life at Sea
UTC	-	Universal Co-ordinated Time

SYNOPSIS

At about 0424 (UTC + 1) on 24 July 2001, the crabber, *Our Nicholas*, grounded near the entrance to Stornoway harbour. The vessel foundered quickly and the four crew members were rescued by two passing fishing vessels.

Our Nicholas arrived at Uig at about 1600 on 23 July 2001. The crew members discharged the catch into transport lorries and loaded 2 tonnes of bait. This took them until 2200. All the crew then went to a local public house. They returned on board at about 2300 and immediately set sail for Stornoway. After they left port, the crew had a meal. One of the three deckhands turned in and the other two remained in the wheelhouse with the skipper. After the vessel had passed the Shiant Islands, the skipper handed over the watch to the deckhands and then went to bed. He gave the deckhands instructions to call him at the last waypoint, which was off the entrance to Stornoway harbour, so that he could take the vessel in.

The skipper was woken by a loud noise. He went to the wheelhouse and found that the vessel had gone aground underneath some cliffs. Immediately, he placed the engine astern and the vessel moved into deeper water. However, the damage was so severe that the vessel began to sink rapidly. The crew abandoned the vessel. Three of them clung to a buoy while the fourth drifted away and became caught in some ropes. Two passing fishing vessels had witnessed the grounding and soon were able to rescue *Our Nicholas'*s crew from the sea. They were taken ashore and to hospital, where one of them was detained for observation because he had swallowed seawater.

Although the hydrostatic release unit (HRU) had released the liferaft, the liferaft did not inflate properly and remained inside its canister. The EPIRB was similarly released from the vessel and its 406MHz transmission alerted a geostationary satellite, but not the polar-orbiting satellites. However, polar-orbiting satellites received the EPIRB's 121.5MHz transmissions and approximate positions were derived.

The cause of the grounding was that both of the deckhands on watch fell asleep and allowed the vessel to continue on passage, unmonitored, until she went aground. The cause of the foundering was that the vessel was taken astern off the grounding site into deeper water, and the damage was so severe that she sank very quickly.

Other findings include a pin in the EPIRB not to have been soldered in place during manufacture, causing the 406MHz beacon to be under-powered. The liferaft's inflation gas pressure was not sufficient to release the liferaft from its canister probably because of a previously undetected leakage.

Safety recommendations have been addressed to the owners with regard to keeping a safe navigational watch, installing a watch alarm and regularly testing EPIRBs on any vessels they own, now and in the future.

Photographs 1 & 2 - Fore and aft views of *Our Nicholas*

SECTION 1 - FACTUAL INFORMATION

All times are UTC + 1

1.1 PARTICULARS OF *OUR NICHOLAS* AND ACCIDENT

Vessel details

Registered owner	:	Mr and Mrs R A Gontier
Port of registry	:	Stornoway
Flag	:	United Kingdom
Type	:	Crabber
Built	:	1964 in France
Construction	:	Wood
Registered length	:	14.7m
Gross tonnage	:	20.33
Engine power	:	119kW

Accident details

Time and date	:	0424 (UTC+1) 24 July 2001
Location of incident	:	Latitude 58° 11.5’ N Longitude 006° 19.9’ W At Holm Point near the entrance to Stornoway harbour
Persons on board	:	4
Injuries/fatalities	:	One crew member detained in hospital overnight after swallowing seawater
Damage	:	Loss of vessel

1.2 BACKGROUND

Our Nicholas normally laid her pots between Haskier Island and Gasker Island **(see chart extract 1)**. There were about 750 pots in each of two separate fishing grounds, at a depth of between 80m and 90m. The 750 pots were grouped in fleets (or strings) of between 30 and 60 pots and were hauled and re-laid every other day on a rotation system. The catch was kept in a vivier tank[1].

Each day the crew worked from about 0630 to between 2200 and 2330, after which the vessel anchored, the crew had a meal and they all turned in. They had to return to Leverburgh to load bait at least once a week. As all the crew lived in various parts of the Isle of Lewis, they were allowed to go home for the night. Because of bad weather, their visits to Leverburgh were more frequent in winter, and, normally they could expect to go home every other night. However, when fuel became cheaper in Uig (also combined with lower transport costs to the market) their visits to this port, rather than Leverburgh, became more frequent in the recent past.

Each crew member worked three weeks on board with one week at home.

1.3 NARRATIVE

On Sunday 22 July 2001, *Our Nicholas* was fully loaded with crabs, which the skipper decided he would discharge at Uig. The lorry transport for the crabs was booked for the Monday. The skipper decided not to go straight to Uig because the fresh water in the harbour is bad for crabs, and the water in the vivier tank was on a circulation cycle of 6 minutes. Instead, *Our Nicholas* arrived at Leverburgh at about 2200 and made fast alongside for the night. All the crew stayed on board. After carrying out a number of chores, they turned in at about 0200.

The crew rose at between 0800 and 0900. However, the vessel did not leave Leverburgh until 1300, because the lorry transport was not due at Uig until about 1600. *Our Nicholas* arrived at Uig at just after 1600 and the crew loaded the catch into two lorries immediately. This was completed at about 2100. They then loaded 2 tonnes of bait into tanks at the stern of the vessel, finishing at about 2200. They then went to a local public house and returned on board at about 2300.

As soon as the crew were back on board, *Our Nicholas* set sail for Stornoway. The vessel did not return to her fishing grounds, because bad weather was forecast, so the opportunity was taken to have some maintenance carried out on her at Stornoway. As the skipper took her out, they had a meal, after which deckhands 1 and 2 remained with the skipper in the wheelhouse, while deckhand 3 turned in below.

[1] A vivier tank is an insulated tank in which shellfish are kept alive in circulated refrigerated seawater **(see Diagram 1)**

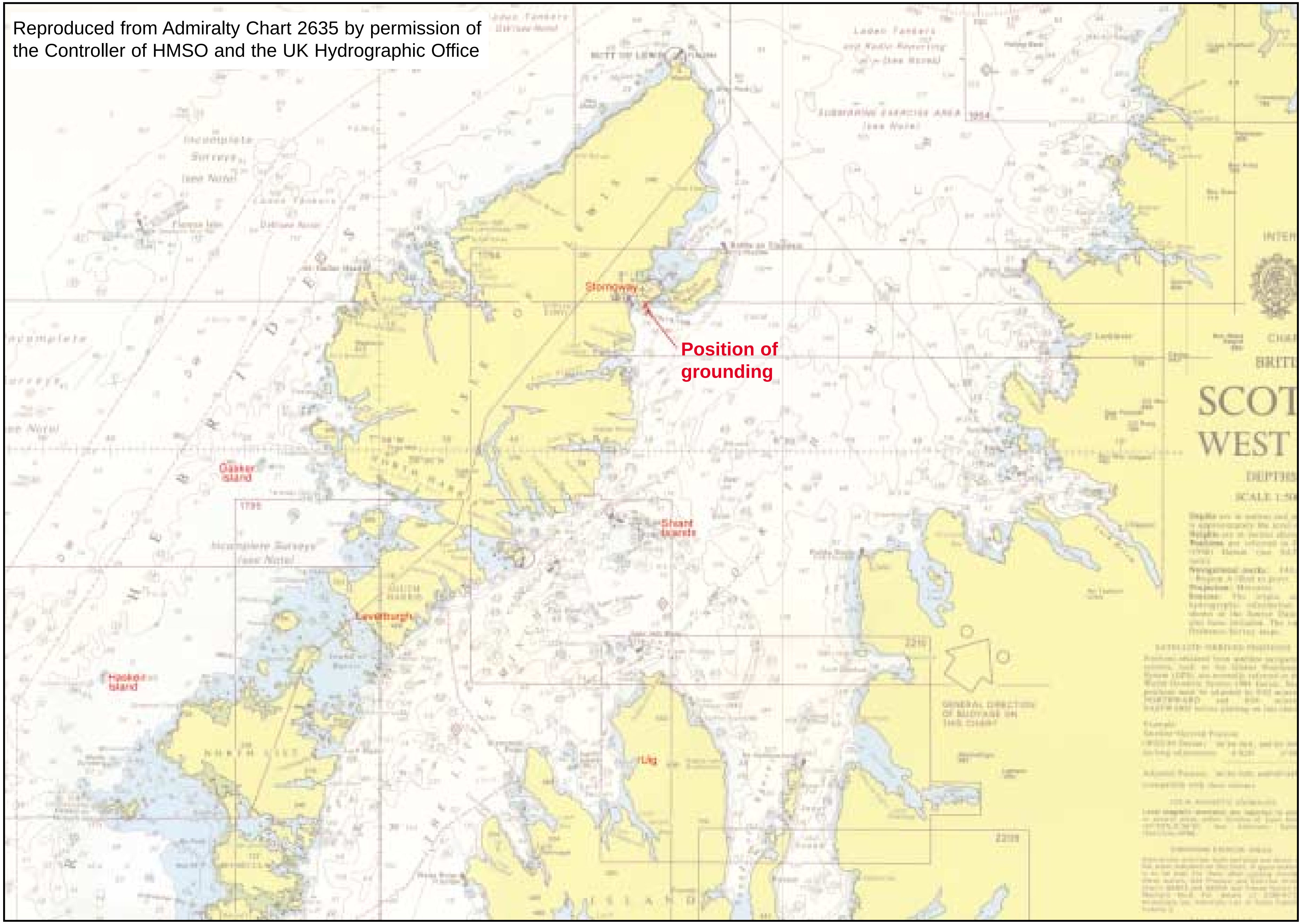


Chart Extract 1

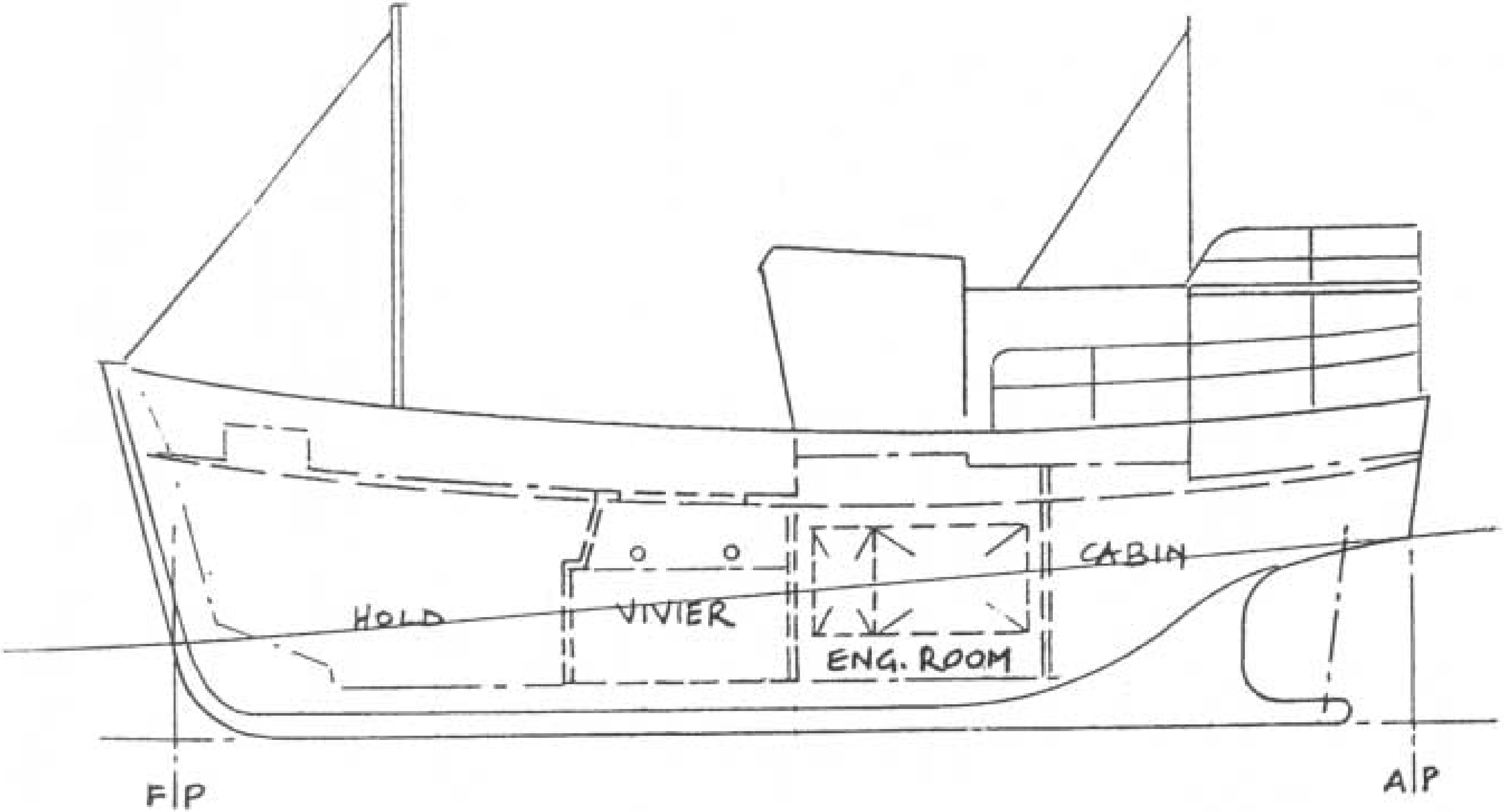


Diagram 1

Diagram of *Our Nicholas*

After the vessel had passed to the east of the Shiant Islands, the skipper handed over the watch to the two deckhands. He told them to call him when the vessel reached the electronic plotter's last waypoint, which was just off the entrance to Stornoway. This would give him time to rise and take the vessel into the harbour. Deckhand 1 decided that he would take charge of the watch by sitting on the wheelhouse chair and monitoring the video plotter. Deckhand 2 was sitting on the wheelhouse bench. The starboard side door was open and there were no heaters on. At some point both deckhands fell asleep.

Later, awoken by a loud noise, the skipper went straight up to the wheelhouse. When he arrived there, he saw, in the twilight, cliffs in front of him and that the vessel's bows were damaged. He placed the engine astern immediately and told deckhand 2 to call deckhand 3 who was still down below in the cabin. The vessel refloated and moved away from the rocks by the cliff and then began to sink rapidly. All the crew members went out through the starboard door and up to the top of the wheelhouse to release the liferaft manually **(see Photograph 3)**. Before they could do this, the vessel foundered.

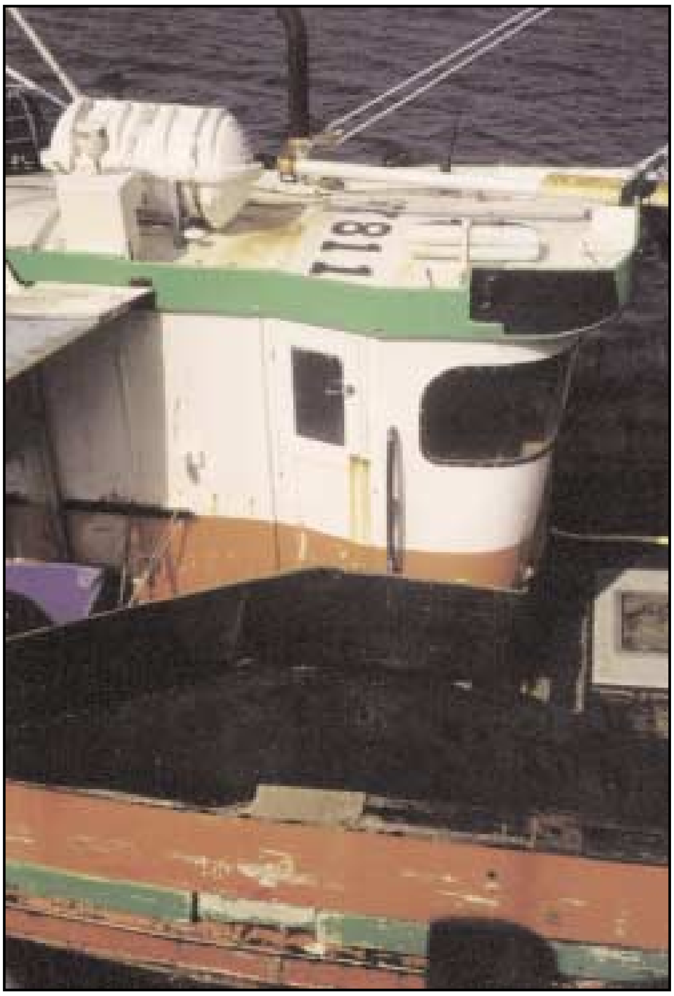
The skipper and deckhands 2 and 3 clung on to a dan-buoy; deckhand 1 was separated from the rest and drifted off. He became caught in some ropes and found it difficult to remain afloat. The fishing vessel *Wavecrest,* which was in the area, approached him and her crew threw him a lifebuoy. He was hauled in and taken on board. The fishing vessel *Ripple,* also in the area, managed to rescue the group of three fishermen and took them on board.

At 0450, *Ripple* reported to Stornoway Coastguard that all the crew had been recovered and that they were returning to Stornoway harbour. When they arrived, an ambulance took them, at 0529, to the local hospital for check-ups. The deckhand who became separated from the rest stayed in hospital because he had swallowed an amount of seawater; the others were allowed to go.

At 0439 an EPIRB alert transmission was detected on 406MHz **(see Section 1.7)** by geostationary satellite G08, but a location could not be resolved and was therefore "detect only". At 0434, polar-orbiting satellite S03 detected the EPIRB's transmission on 121.5MHz and gave two positions, but they were unresolved as they varied considerably. However, polar-orbiting satellite S06 detected a 121.5MHz transmission from the EPIRB at 0517 and gave two positions, which were near to the actual position. Two more 121.5MHz detections were made, one at 0526 by polar-orbiting satellite S08, and the other at 0625 by polar-orbiting satellite S03, each giving a position.

The liferaft from *Our Nicholas* was recovered from the site of the wreck and it was found that, after it had been released from the vessel by the HRU, it had only partly inflated and was still in its canister **(see Section 1.6 and Photograph 4)**.

Photograph 3



The wheelhouse top showing the liferaft stowage location and starboard door

Photograph 4

The liferaft recovered from *Our Nicholas*

1.4 ENVIRONMENTAL CONDITIONS

The wind was force 3 from the south-east, and the sea state was moderate with a low swell.

Sunrise was just after 0500.

1.5 *OUR NICHOLAS*

1.5.1 The vessel

Our Nicholas was constructed of wood with carvel planking. The wheelhouse was of GRP construction, and was attached to a timber superstructure forming the upper accommodation. Within this structure was the access hatch to the engine room, the starboard side of the wheelhouse and the lower crew accommodation. There were three full wooden transverse bulkheads; one aft of the forward hold, one forward of the engine room, both of which formed the vivier tank bulkheads, and one aft of the engine room, which formed the forward bulkhead of the crew accommodation **(see Diagram 1)**. The keel was faced with a steel protective band running from above the waterline at the stem for its full length to the wooden skeg forming the rudder support.

The fishing vessel, previously named *Jaquelin* and registered in Guernsey, had been purchased by the present owner in 1998 and registered in the United Kingdom. Her United Kingdom Fishing Vessel Certificate was issued on 20 December 1999 and was valid until 30 May 2003.

1.5.2 The crew

<u>The skipper</u> was 32 years old and had been fishing at sea for about 15 years. He had started his fishing career on trawlers but, after one year, he began serving on Channel Island and Irish potters, the type of vessel on which he had been engaged ever since. He had been skipper for about the last 8 years and full-time for the last 5 years. He had been sailing on *Our Nicholas* in place of the owner/skipper, who had broken his ankle, for about 3 weeks before the accident. He did not have a certificate of competency, but had obtained certificates for GMDSS and the three safety courses, fire-fighting, first-aid and sea survival.

<u>Deckhand 1</u> was 25 years old and had been fishing exclusively on *Our Nicholas* for about a year. He did not have any certificates for the safety courses.

<u>Deckhand 2</u> was 26 years old and had been fishing on local scallop boats and trawlers for about 5 years. He had been sailing on *Our Nicholas* for about 9 months. He had a certificate for the sea survival safety course.

Deckhand 3 was 19 years old and had been fishing on scallop boats and trawlers on the west coast of Scotland for over 2 years. He had certificates for all three safety courses.

For a fishing vessel of less than 16.5m, no certificates of competency are required.

1.5.3 Navigational equipment

Our Nicholas had the following relevant navigational equipment:

A Sestrel magnetic compass;

A Koden CVS 821 echo sounder;

A Ratheon plotter (with black and white display);

A Furuno radar with a 42-nautical mile range and daylight display;

A Robertson AP-35 autopilot (without a watch alarm); and

A DGPS set with an input to a Furuno Sea Max Plotter with C-MAP electronic charts for the whole of the North of Scotland.

1.5.4 Lifesaving appliances

Our Nicholas had the following relevant lifesaving equipment:

One four-person Viking liferaft (last serviced in January 2001) stowed on top of the wheelhouse **(see Photograph 3)** and equipped with a Hammar HRU;

One Locat (McMurdo) LDT 61A EPIRB, manufactured in June 1997, with a battery end-of-life date of 05/2002, equipped with a Hammar HRU;

Four Shipshape lifejackets stowed in the galley seat locker;

Two Perrybuoy lifebuoys stowed to port (with 18m line) and starboard (with smoke float and light marker) of the wheelhouse sides; and

12 rocket parachute flares.

1.6 LIFERAFT SERVICING AND INFLATION SYSTEMS

1.6.1 Servicing

IMO regulation III/19.8.1 of SOLAS 1974 (as amended) requires that every inflatable liferaft be serviced at intervals not exceeding 12 months, which may be extended to 17 months. Liferafts should be serviced at an approved servicing station, which is competent to service them, maintains proper servicing facilities, and uses only properly trained personnel. Government administrations should ensure that the periodic survey of liferafts is performed at servicing stations that have demonstrated competence to service and repack rafts, maintain an adequate facility and use only properly trained personnel.

With regard to inflation systems, service stations should have the following:

A scale for weighing inflation gas cylinders with sufficient accuracy.

Procedures to ensure that each gas cylinder is properly filled and gastight before fitting to the liferaft.

The following tests on gas inflation systems should be carried out at service stations on every liferaft:

A gas inflation test should be carried out at 5-year intervals, and when undertaking a gas inflation test, special attention should be paid to the effectiveness of the relief valves. The folded liferaft should be removed from its container before activating the fitted gas inflation system. After gas inflation has been initiated, sufficient time should be allowed to enable the pressure in the buoyancy tubes to become stabilised and the solid particles of CO_2 to evaporate. After this period, the buoyancy tubes should, if necessary, be topped up with air, and the liferaft subjected to a pressure holding test over a period of not less than one hour during which the pressure drop will not exceed 5% of the working pressure.

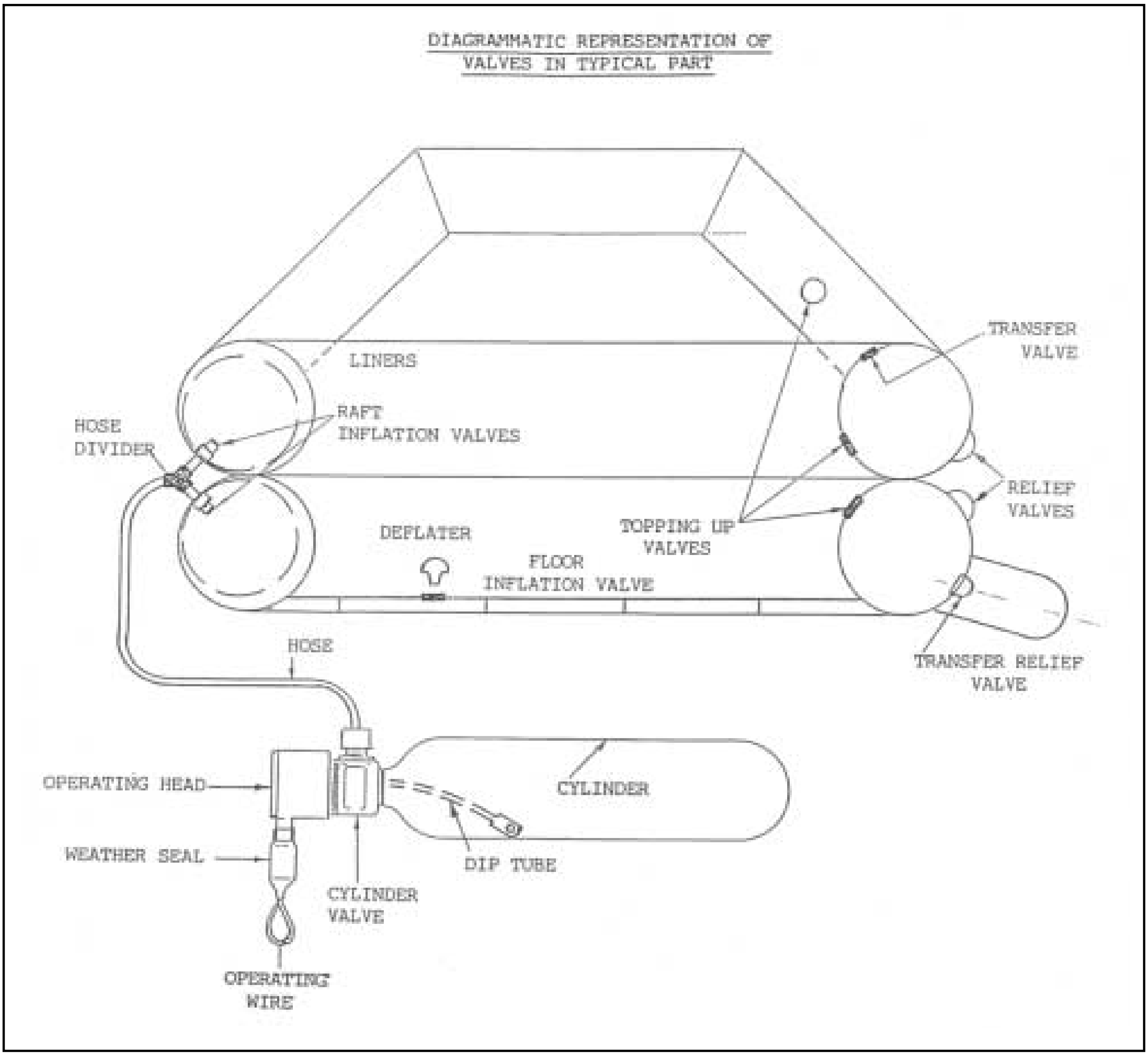
(see Section 2.3)

1.6.2 Inflation

The gas most commonly used for liferaft inflation is carbon dioxide, which is a high-pressure liquifiable gas, and which can quite easily condense down to its liquid state at room temperature at a pressure of about 70 bar. In this form it is easily stored in relatively small cylinders.

The cylinder valve prevents the gas from escaping until required. To enable the CO_2 to inflate the type of liferaft on *Our Nicholas,* a system known as the "knife and cutter" is used. When activated, the knife pierces the diaphragm and allows the gas to escape from the cylinder to the gas hose. The diaphragm also acts as a bursting disc if and when the cylinder pressure rises towards its test pressure. The operating head used a stored energy system by means of a spring, which drove the knife rapidly and over a controlled distance into the diaphragm **(see Diagram 2)**.

Diagram 2



1.7 EPIRBS

1.7.1 Purpose

The purpose of an EPIRB **(see Photograph 5)** is to send a distress message via a satellite to a ground-receiving station. There are two satellite systems in use, COSPAS-SARSAT and Inmarsat; the former is jointly owned by the USA, Canada, France and Russia, and the latter is an organisation owned by 79 countries which operates the global mobile communication satellite system.

Photograph 5

The EPIRB recovered from *Our Nicholas*

1.7.2 COSPAS-SARSAT

This satellite system is dedicated to locating distress beacons transmitting on 406MHz and 121.5MHz, the latter of which can be received by civilian aircraft. Low-altitude, polar-orbiting satellites can also detect and locate beacons worldwide. Once a satellite has received a distress transmission, it is relayed to a Low Earth Orbit Local User Terminal (LEOLUT) (or ground-receiving station) where the signal can be processed to determine the location, and other coded information. The LEOLUT alerts its Mission Control Centre, which in turn alerts an MRCC (Falmouth, in the case of the UK) with location and other data.

The location system uses a change of apparent frequency of the beacon due to the relative motion between the satellite and the beacon; otherwise known as Doppler shift. By plotting the frequency change and the rotation of the earth with the known position of the satellite at any time, the beacon's position can be determined. The 406MHz transmission gives a more accurate position from one satellite pass than the 121.5MHz transmission, and the former can give a unique vessel identification code.

There are a limited number of polar-orbiting satellites, resulting in a delay – which is greater at the Equator than at the poles – in detecting a distress transmission.

1.7.3 Inmarsat

Inmarsat is a global communication system which uses a network of geostationary satellites. They are located over four ocean regions, giving an overlapping coverage. The Inmarsat system is capable only of detecting Inmarsat E EPIRBs, transmitting on 1.6GHz, which have a GPS input, allowing rapid detection, except above 76°N and 76°S. However, geostationary satellites within the COSPAS-SARSAT system, as well as polar orbiting satellites described above, can pick up the 406MHz transmission from an EPIRB but not the 121.5MHz transmission.

1.7.4 Testing

Regulation 26 of *The Merchant Shipping (Radio) (Fishing Vessels) Regulations 1999* for non-directive fishing vessels (new fishing vessels of 12m or more in length but less than 24m in length, and existing fishing vessels of 12m or more in length but less than 45m in length) states:

> ***Maintenance requirements***
>
> *Equipment required by this Part shall be maintained to such a standard as will ensure that the functional requirements specified in regulation 8 are met, and that the performance standards recommended by the Organization for such equipment are met.*

Regulation 8 states:

> ***Functional requirements***
>
> *Every fishing vessel, while at sea, shall be capable of-*
>
> *(a) transmitting ship-to-shore distress alerts by at least two separate and independent means, using different radio communication services……*

(see Section 2.4)

1.8 FATIGUE

The following are extracts, relevant to this case, taken from the Transport Safety Board of Canada's *A Guide for Investigating for Fatigue*.

Alertness and fatigue

Fatigue has its basis in the combined interaction of the circadian rhythm[2] *in alertness/sleepiness and the effects of inadequate sleep. As fatigue increases, the brain appears to fall asleep involuntarily, against the will of the operator, especially (but not exclusively) when performance demands involve sustained attention and monotony; thus the effects of fatigue on performance are based on changes in brain function.*

Alertness cycles closely follow the body temperature cycle, with peak alertness occurring when the body temperature is high (near midday) and low alertness occurring when the body temperature is lowest (between 0300 and 0500).

The time of day that one works has far greater effect on alertness than the number of consecutive hours worked. People can work extended hours per day and maintain high levels of alertness and performance, as long as those work hours are between 0700 and 2300 in their normal cycle.

Alertness can be influenced by a number of factors: sense of danger, interest or opportunity; muscular activity; time of day on the circadian clock; sleep bank balance; controlled, strategic napping; ingested nutrients and chemicals and environmental light, temperature, humidity, sound, and aroma.

Sleep/wake cycle

In normal conditions, the sleep/wake cycle follows a 24-hour rhythm with approximately 1/3 of this time spent sleeping.

Everybody's cycle has two distinct peaks and dips. The big dip is at night, with the time of our lowest alertness in the hours before dawn between 0300 and 0500.

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[2] A cyclical variation in the intensity of a metabolic or physiological process, or of some facet of behaviour, of about 24 hours

Quantity of sleep

> *Over 90% of the population needs between 7.5 and 8.5 hours of sleep per 24-hour day.*
>
> *Alertness and performance are directly related to quantity of sleep.*
>
> *Acute sleep loss results, when one is awake without sleep beyond the normal 14- to 16-hours waking day; the longer one is awake, the greater the effect on performance.*

Effects of fatigue on performance

> *During night-time hours most types of human performance, whether manual dexterity, mental arithmetic, reaction time, or cognitive reasoning, are significantly impaired.*
>
> *The most extreme form of fatigue is uncontrollable sleep, that is, falling asleep against the will of the individual. The sleep period can be a microsleep, a nap, or a long sleep episode. While asleep, a person is perceptually isolated, that is, they are unaware of what is going on around them.*

Deckhands 1 and 2 had about 4.5 hours sleep in the 24 hours leading up to the accident, **(see Section 1.3)** and about 6 to 7 hours in the previous 46 hours. In addition to sleep debt, other potential contributing factors to fatigue were their consumption of alcohol and a meal, and the monotony of simply watching the track of the vessel on the electronic plotter.

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributing causes and circumstances of the accident as a basis for making recommendations, if any, with the aim of preventing similar accidents occurring again.

2.2 THE GROUNDING AND FOUNDERING

2.2.1 The grounding

During normal fishing operations, the crew members were able to sleep each night between about 2200/2300 and about 0630, when the vessel was at anchor. Sometimes they were allowed to go home for the night. However, on this occasion, their sleeping routine was disrupted by the voyage from Uig to Stornoway, which was the first time they had made such a long passage. Normally the vessel's passages were quite short and not made after midnight, which is why the owner decided not to fit a watch alarm. Had one been fitted, it would have significantly reduced the chances of the watchkeepers falling asleep.

Deckhands 1 and 2 had only about 4.5 hours sleep in the previous 24 hours and about 6 to 7 hours sleep in the 46 hours since they had risen 2 days before. Therefore, they were suffering from a sleep deficit. They had spent most of the day working until about 2200. They drank some alcohol ashore in Uig, and eaten a meal after the vessel had left port at about 2300. Once the vessel had passed Shiant Islands, the skipper handed over the watch to deckhands 1 and 2 (although deckhand 1 actually took the watch) so that he could go to bed for an hour or so before arriving off Stornoway. There was only one courseline for the watchkeeper to follow. The deckhand sat on the wheelhouse chair. His only tasks were to monitor the vessel's progress in relation to the track line laid down, to adjust the course accordingly and to keep a lookout; none of which were physically or mentally stimulating. All the above circumstances, combined with the time of day when they were at their lowest alertness in the hours before dawn between 0300 and 0500 **(as described in Section 1.8),** led both the deckhands in the wheelhouse to fall asleep and to allow the vessel to continue on passage unmonitored until she went aground.

It would have been wise to have stayed in Uig until the crew had been sufficiently rested, before making the passage to Stornoway. (Section 3 of the MCA's Marine Guidance Note 84 (F) *Keeping a safe navigational watch on fishing vessels Fitness for duty.)*

2.2.2 The foundering

Awoken by a loud noise, the skipper went straight to the wheelhouse and placed the engine astern to take the vessel off the rocks. However his action was unwise, because when the vessel reversed into deeper water, the damage was of such severity that she began to sink rapidly. Before taking this action he should have checked the damage. This is another indicator that the crew members were suffering from fatigue and the skipper's decision-making and judgment as to the outcome of his actions were impaired.

The crew had to abandon the vessel so quickly that there was insufficient time to make a distress call and to launch the liferaft manually. If the skipper had allowed the vessel to remain at her grounding position, she might have remained stable for long enough to make a distress call and for the crew to be rescued by passing craft or by the emergency services.

Bearing in mind the problems with the EPIRB and the liferaft, it was fortunate that two local fishing vessels in the area witnessed the grounding and were able to rescue the crew quickly and effectively.

2.3 THE LIFERAFT

When *Our Nicholas* foundered, the HRU released the four-person liferaft. However, as **Photograph 4** shows, the liferaft inflated only sufficiently to break one of the two bursting straps, which held the two halves of the canister together. The inflation gas pressure was insufficient to inflate the liferaft and to release it from its canister.

The servicing log card showed that the liferaft was due for its 5-yearly inflation test at its next inspection **(see Section 1.6.1)**. However, the gas cylinder had been weighed on at least four previous annual services, and so the loss of gas must have occurred since the last service.

The liferaft and its canister were returned to the hire company, Premium Liferaft Services, in Essex. An inspection and service of the liferaft suggested that there was a problem with the inflation system. Checks of the operating head and gas hoses found them to be in working order. This led to the conclusion that the cylinder was possibly at fault. The cylinder was sent to an independent testing house to determine why it had contained insufficient gas to inflate the liferaft properly.

The test house's report listed two possible causes:

1. *The liferaft cylinder cutting head could have been over tightened into the valve ever so slightly scoring the cutting disc and seeping out gas.*

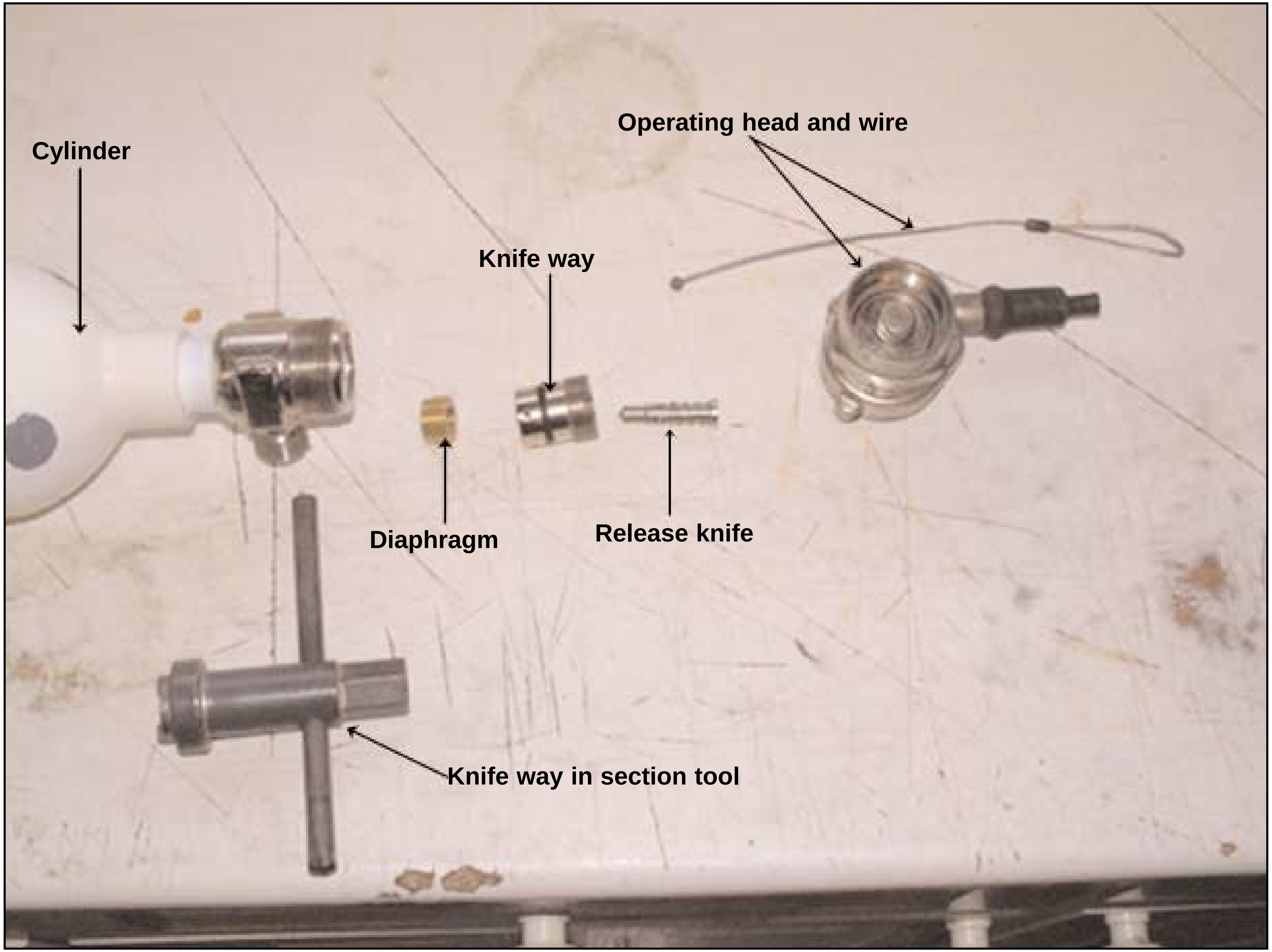
2. *Possibly the bursting disc and the cutting disc or the valve going into the cylinder was not tightened enough and was not locked in place with a thread sealant and could have possibly come loose during transportation and started to seep gas through to the threads. However, the threads between the valve and the cylinder were checked by the inspector in the workshop and the disc was fitted to the correct torque of 40Nm and the unit tested had no bursting disc.*

When either the cylinder is refilled, or at the annual weighing, and the diaphragm is in place, the knife way and the release knife is screwed into the cylinder head with the special tool **(see Photograph 6)**. If, as suggested in 1 above, the knife way had been over-tightened, the release knife might have scratched the diaphragm allowing gas to be released. However, the insertion tool only allows the knife way to be screwed in to a point where the tool butts up to the end of the cylinder.

When the liferaft had its inflation test, over 4 years before the accident, the cylinder was refilled with gas. This is a special process in which the diaphragm is inserted at the same time **(see Photograph 7)**. If, as suggested in 2 above, it had been under-tightened, gas could have seeped through the thread. However, the torque at which the diaphragm was fitted was correct, the previous 4 weighing tests would have shown loss of gas.

Since both the causes given by the test house were discounted, Premium Liferaft Services’ staff were left to speculate on why the liferaft did not inflate properly. Their assumption was that, since the last service, the liferaft had experienced a significant impact causing the spring, which holds the trigger knife, to depress sufficiently to allow the knife to scratch the cylinder diaphragm. This might have allowed gas to seep into the liferaft. However, the rate of leakage was sufficiently slow to prevent the liferaft from breaking out of the canister, and the escaping gas found its way to the relief valves. The cylinders contained enough gas to inflate the liferaft twice-over. The scratch to the diaphragm must have occurred some time before the liferaft was released from the foundering vessel.

The liferaft had been serviced in February 2001 and had been stowed on the wheelhouse top where it was intended to remain until its next service a year later. If the release of gas had been slow, it would seem that the impact to the liferaft mentioned above might have occurred between the service station and its stowage on the vessel about six months previously. Because of their weight, liferafts are usually transported by lorries or vans from the service station to the vessel. Perhaps it was during the delivery or the installation process that the liferaft suffered an impact of such severity, because of mishandling, and the spring allowed the knife to scratch the diaphragm and to release slowly the gas over the ensuing six months.



Photograph 6

Photograph showing the various parts of the gas release mechanism

Photograph 7

An end view of a gas cylinder with the diaphragm in place

2.4 THE EPIRB

The EPIRB was recovered by the emergency services from the scene of the wreck and was then returned to McMurdo for testing as the polar-orbiting satellites had not detected any 406MHz transmissions from the unit **(see Section 1.3)**.

The EPIRB was manufactured in June 1997 with a battery expiry date of May 2002. (The model LDT61A EPIRB was manufactured since September 1999 and a total of 2,397 units have been shipped during its production life.) At the time of manufacture the EPIRB had been subjected to all factory tests, including water leak tests and checks on 121.5MHz and 406MHz transmissions. It had passed these tests.

In the “as received condition” at the time of testing, a small crack was found in the side of the top plastic moulding of the EPIRB, the strobe light was inoperative and the 406MHz beacon was below power.

An internal inspection revealed signs that there had been a slight ingress of water at some time, but no water was present; the output pin for the power amplifier was not soldered; the power amplifier had a low radio frequency output and a transistor in the strobe light circuitry was inoperative.

It was concluded by McMurdo that the power output from the 406MHz beacon was substantially below specification, because of an intermittent circuit between the output pin and the printed circuit board, where the joint had not been soldered. There might have been sufficient continuity between the pin and the side of the plated-through hole to allow the EPIRB to pass the initial tests. The EPIRB did transmit once on 406MHz to the geostationary satellite but once it had been released from *Our Nicholas,* its movement in the sea probably interrupted the continuity and stopped any further transmissions on that frequency. However, the problem should have appeared in an onboard self-test failure, because the continuity would tend to fail after the EPIRB had been subjected to vibration on board the vessel and, possibly, during manhandling during installation. No similar failures of the 406MHz beacon have been recorded and McMurdo considered the probability of similar occurrences to be low.

The failure of the strobe light was probably caused by an ingress of a small amount of water on to the high-voltage circuit area of the printed circuit board. It is not known how the small crack occurred, but it should have been noted had a self-test been carried out.

Maintenance requirements for radio equipment on non-directive fishing vessels of *Our Nicholas*'s size are given in regulations 8 and 26 of *The Merchant Shipping (Radio) (Fishing Vessels) Regulations 1999* **(see Section 1.7)**, which stipulate that the owner should ensure that the on-board equipment should be capable of transmitting a distress message by two separate means using different communication services. As *Our Nicholas* had one fixed and one portable VHF radio, the EPIRB satisfied the requirement to transmit on another service other than VHF radio. To ensure that the EPIRB was capable of transmitting, the self-test should have been used to check it was functioning correctly. Had this been done, the problems with the EPIRB should have been noted before the time of the accident.

(With respect to directive fishing vessels, the regulations stipulate that the skipper must appoint a person to carry out tests and checks on each EPIRB every month to ensure it is capable of operating properly and be able to float free, and to check the mounting for any signs of damage.)

SECTION 3 - CONCLUSIONS

3.1 CAUSES AND CONTRIBUTING FACTORS

3.1.1 The grounding

1. Both of the deckhands in the wheelhouse fell asleep and allowed the vessel to continue on passage, unmonitored, until she went aground. [2.2.1]

   - The deckhands had had only about 4.5 hours sleep in the previous 24 hours and about 6 to 7 hours sleep in the 46 hours since they had risen 2 days before. Therefore, they were suffering from fatigue owing to a sleep deficit. [2.2.1]

3.1.2 The foundering

2. The skipper went straight to the wheelhouse and placed the engine astern to take the vessel off the rocks. When the vessel reversed into deeper water, the damage was of such severity that she began to sink rapidly. The skipper did not check for damage first. [2.2.2]

   - The skipper's judgment as to the outcome of his actions was probably impaired by fatigue owing to a sleep deficit. [2.2.2]

3.2 OTHER FINDINGS

1. During normal fishing operations, the crew members were able to sleep each night between about 2200/2300 and about 0630, when the vessel was at anchor. On this occasion, their sleep routine was disrupted by the voyage from Uig to Stornoway, which was the first time they had made such a long passage. [2.2.1]

2. Other possible contributions to fatigue were:

   - The crew had consumed an amount of alcohol ashore in Uig and then eaten a meal after the vessel had left port. [2.2.1]

   - The deckhand on watch sat on the wheelhouse chair. His only tasks were to monitor the vessel's progress in relation to the track line laid down, to adjust the course accordingly and to keep a lookout, none of which were physically or mentally stimulating. [2.2.1]

   - The crew were at their lowest alertness in the hours before dawn between 0300 and 0500. [2.2.1]

3. Normally the vessel’s passages were quite short and not made after midnight, which is why the owner decided not to fit a watch alarm. A watch alarm would have significantly reduced the chances of the watchkeepers falling asleep. [2.2.1]

4. In view of the probable effects of fatigue, it would have been wise to have stayed in Uig until the crew had been sufficiently rested before making the passage to Stornoway. [2.2.1]

5. The liferaft inflated only sufficiently to break one of the two bursting straps, because the inflation gas pressure was insufficient to inflate the liferaft and to release it from its canister. [2.3]

6. Servicing records indicated that the loss of gas must have occurred since the last service. [2.3]

7. Mishandling during transportation or installation might have caused a significant impact, causing the spring and the knife to depress sufficiently to scratch the cylinder diaphragm and allowed gas to start to seep into the liferaft. [2.3]

8. The EPIRB’s power output from the 406MHz beacon was substantially below specification, because of an intermittent circuit between the output pin and the printed circuit board, where the joint had not been soldered. No similar failures of the 406MHz beacon have been recorded, and the manufacturer considered the probability of similar occurrences to be low. [2.4]

9. The failure of the EPIRB’s strobe light was probably caused by an ingress of a small amount of water on to the high-voltage circuit area of the printed circuit board. [2.4]

10. Both of the above failures should have been detected by self-tests on the EPIRB. [2.4]

SECTION 4 - RECOMMENDATIONS

The owners, Mr & Mrs M R Gontier, are recommended to:

1. Heed the advice given in the MCA's Marine Guidance Note 84 (F) *Keeping a safe navigational watch on fishing vessels* for future operations.

2. Install a watch alarm on all of their vessels.

3. Ensure that any EPIRB, installed on any of their vessels, is tested at regular intervals.

Marine Accident Investigation Branch
August 2002