

Extract from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such 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 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

© Crown copyright, 2016

You may re-use this document/publication (not including departmental or agency logos) free of charge in any format or medium. You must re-use it accurately and not in a misleading context. The material must be acknowledged as Crown copyright and you must give the title of the source publication. Where we have identified any third party copyright material you will need to obtain permission from the copyright holders concerned.

All reports can be found on our website:

www.gov.uk/maib

For all enquiries:

Email: maib@dft.gsi.gov.uk

Tel: 023 8039 5500

Fax: 023 8023 2459

Fatal man overboard from *Apollo* (INS 179) 30nm north-west of the Orkney Islands 18 April 2016

SUMMARY

At 0630¹ on 18 April 2016, a crewman fell overboard from the stern of the 23.95m fishing vessel *Apollo* (**Figure 1**) while the nets were being hauled. The weather was rough at the time of the accident and the crewman was not wearing a personal flotation device (PFD)².

The crewman managed to grab hold of the trawl warps and the crew hauled in the gear to pull him back towards the stern. He then held onto a lifebuoy that had been lowered down to him. The crew attempted to recover him from the water, but he appeared to let go of the lifebuoy and disappeared below the surface. The crewman had been in the water, which was 9°C, for about 7 minutes.

An extensive search was carried out by coastguard helicopters, military aircraft and *Apollo's* crew, but without success. The crewman's body was recovered by another fishing vessel nearly 4 months later.



Figure 1: *Apollo* (INS 179)

¹ All times are UTC + 1 hour (UTC is Universal Co-ordinated Time).

² PFD = Personal Flotation Device is the generic name for lifejackets and buoyancy aids.

Following the accident, the vessel's owner reviewed the risk assessments for the crew when working on deck and trained them in the operation of new equipment which was supplied to assist man overboard recovery. An existing requirement for the crew to wear PFDs when working on deck was re-enforced.

Recommendations have been made to the vessel's owner that are designed to ensure that realistic manoverboard drills are carried out and that the crew do not place themselves in exposed locations during fishing operations.

FACTUAL INFORMATION

Background

Apollo (INS 179) was a steel hulled stern trawler that was equipped to use either twin or single net trawl gear; at the time of the accident a single trawl net was being used.

The target catch for the single net was 'white fish' (e.g. haddock and cod). Each trawl lasted about 5 hours, during which time the crew would sort and stow the catch from the previous trawl and take some rest until required on deck for hauling the net.

The vessel normally spent up to 10 days at sea before returning to port, when the crew would take a 2-day break.

Environmental conditions

Wind: Westerly, force 8; Sea state: Rough (waves up to 4m); Visibility: Good.

Sea temperature: 9°C

Narrative

Apollo sailed from Kinlochbervie, north-west Scotland, at 1840 on 14 April 2016 to return to fishing grounds 30nm north-west of the Orkney Islands.

At 0030 on 18 April, the crew shot the net and set the auto-trawl winch control for a 5-hour tow. The mate then took over the wheelhouse watch from the skipper and remained on watch until 0330 when a crewman, Craig Reid, took the watch.

At 0345 the trawl net became fast on the seabed. Craig called the skipper, who came to the wheelhouse and cleared the net to enable the tow to continue.

The skipper returned to the wheelhouse at 0530 to take the watch and, shortly afterwards, called the crew to prepare for hauling the net.

At 0613 the skipper began hauling the net, which was controlled from the wheelhouse. The crew donned their oilskin clothing and went onto deck; the sea was rough and water was regularly washing onto deck. None of the crew were wearing PFDs.

At 0620 the trawl doors were recovered and secured, and the sweeps and bridles³ (**Figure 2**) were then transferred onto the forward starboard net drum (**Figure 3**).

³ The bridles, also known as 'doubles', consisted of wire and chain connected to the net from the wire sweeps

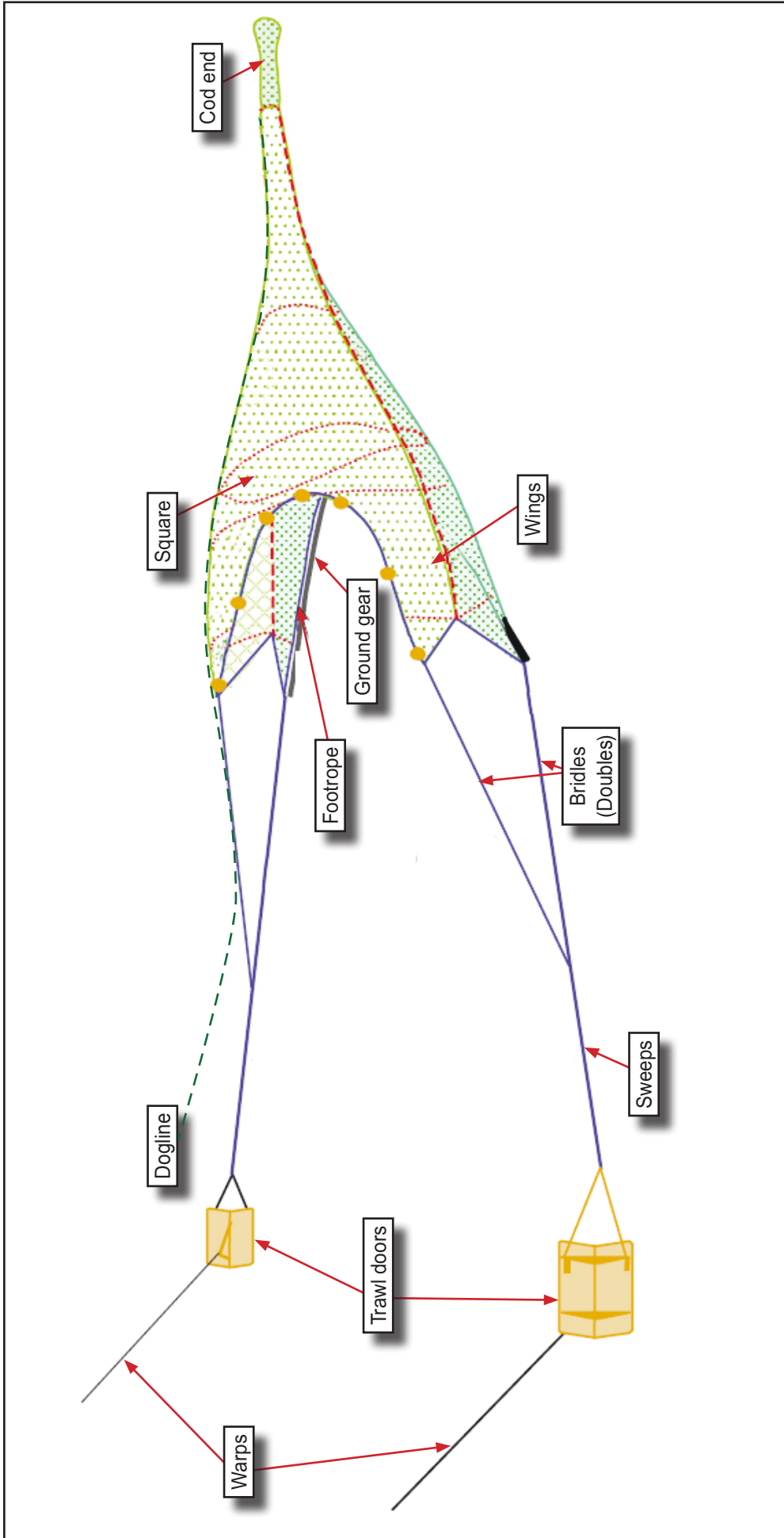


Figure 2: Trawl gear in use on Apollo

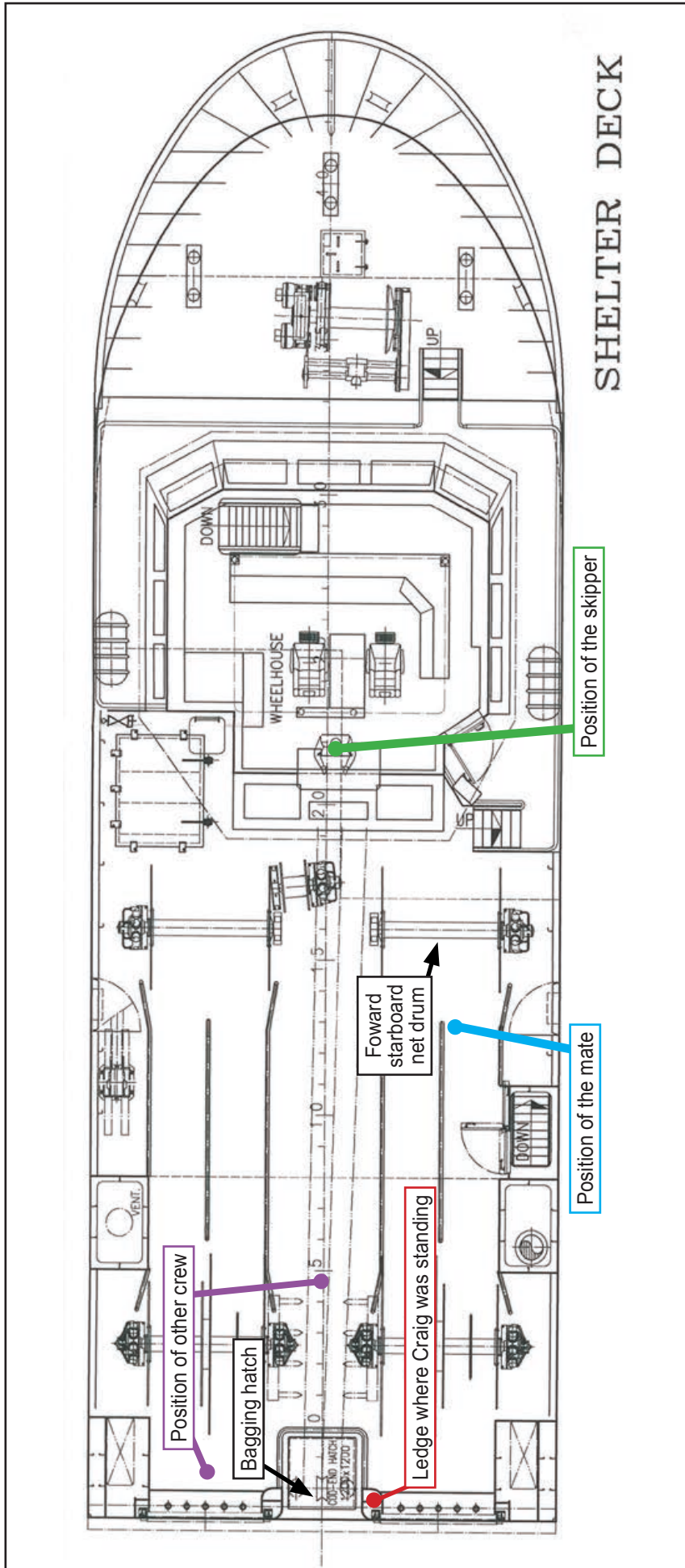


Figure 3: Apollo – plan of deck layout

The mate stood aft of the net drum to guide the wires onto the drum. The remainder of the crew each had designated roles. Craig's role was to remove the shooting pole⁴ from its slot at the stern once the bridle wires had been recovered (**Figure 4**). This would enable the net to then be hauled onto the drum.

At about 0629 the mouth of the trawl net was about 40m from the stern when a larger than average wave lifted the vessel's stern. As the stern dropped into the trough of the wave, the shooting pole was pulled violently and noisily from its housing and fell onto the deck.

Craig had been standing on a narrow ledge at the stern (**Figure 4 inset**), 1m above deck level, when the shooting pole was pulled out. He was then seen to fall and land on his side in the unguarded area aft of the bagging hatch, the stern doors having already been opened in preparation for the recovery of the cod end of the net.

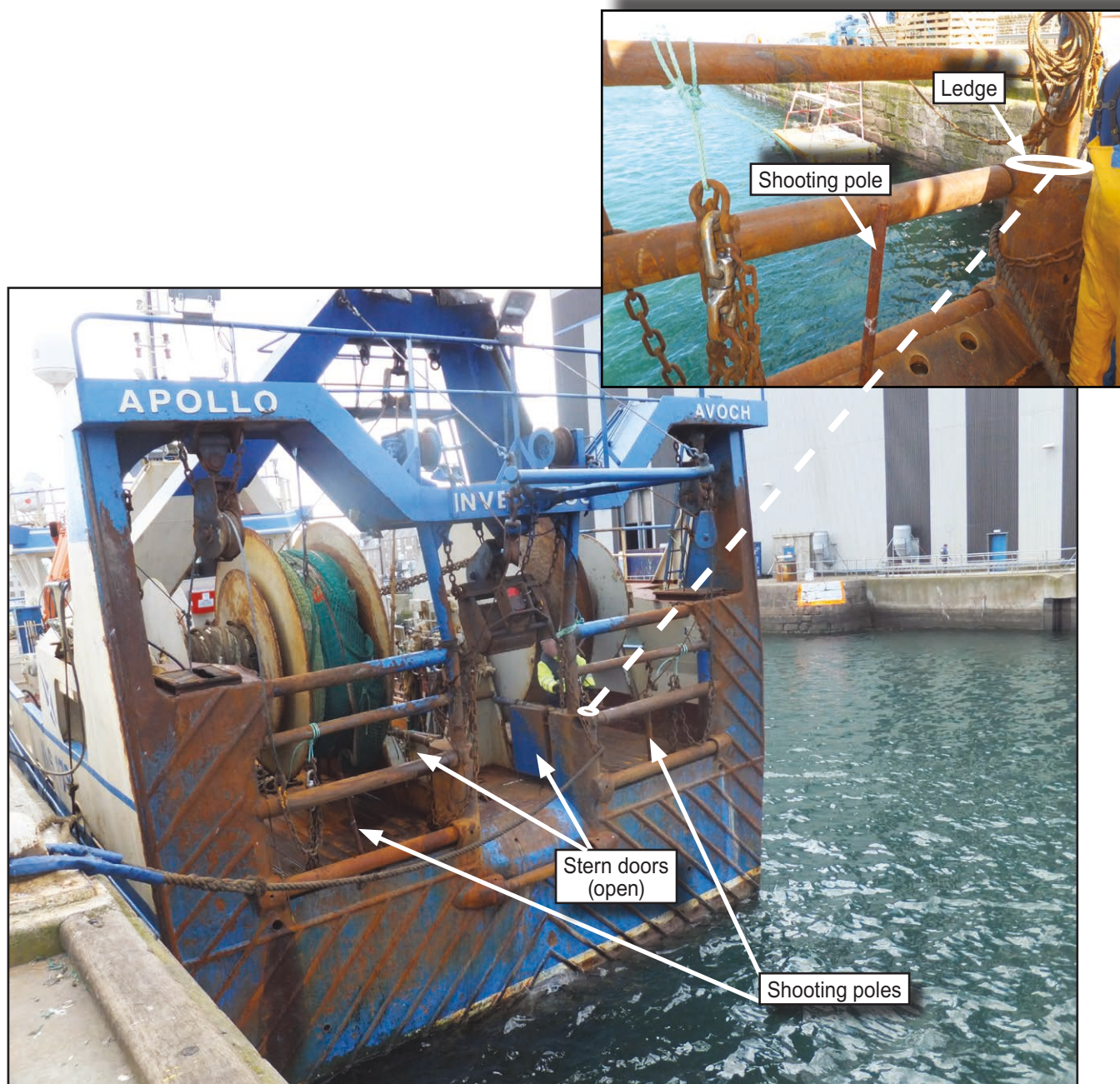


Figure 4: *Apollo* – stern doors and shooting poles
(inset: shows the ledge where Craig was standing at the time of the accident)

⁴ Shooting pole, commonly called a guide pole in the fishing industry. = a hollow steel pole weighing approximately 25kg used to separate the two sets of bridle wires during hauling.

At 0630, before any of the crew were able to reach him, Craig fell overboard. The crew then shouted 'man overboard', threw a lifebuoy with a smoke float attached and the skipper reduced the vessel's speed.

Craig was seen to drift away from the vessel and was unable to reach the lifebuoy, but he did manage to grab hold of one of the bridle wires about 20m from the stern. This enabled the crew to use the net drum to pull him back towards the vessel. The wave height was about 4m and, as the vessel pitched, Craig was occasionally lifted clear of the water as he clung onto the wire.

Once Craig had been pulled back to the stern, the winch was stopped and a lifebuoy, with line attached, was lowered down to him. Craig released his grip on the wire and put an arm through the lifebuoy; the crew were attempting to talk to him during this time but he did not respond. One of the crew leant over the stern and managed to grasp the top of Craig's oilskin jacket, but he was unable to maintain his hold due to the vessel's rise and fall.

A hook rope connected to the Gilson⁵ winch was then lowered and, after several attempts, was hooked into the lifebuoy's grab line. The crew were ready to heave on the Gilson rope when Craig, who by that time had been in the water for about 7 minutes, was seen to lose his grip of the lifebuoy and slip below the surface of the water.

The crew searched desperately for Craig and at 0636 he was seen briefly, face-down and motionless off the vessel's starboard side, before once again slipping below the surface. The skipper marked the manoverboard position on the chart plotter and the trawl net was hauled on board. The vessel was then manoeuvred to search for Craig.

At 0652 the skipper reported the man overboard to the coastguard, which co-ordinated a search operation for Craig. The search operation was conducted by coastguard helicopters, military aircraft and surface vessels. The Stromness lifeboat, which had been launched to assist the search, was instructed to return to its base due to the adverse weather conditions and the predicted survival time for a person without a lifejacket in water of temperature 9°C. The search for Craig proved unsuccessful and was called off at 1514.

Craig's body was finally recovered by another fishing vessel on 31 July 2016.

Crew

There were six crew on board *Apollo* at the time of the accident. Five were British and one was Filipino. Four of the British men, including Craig, were members of the same family and the other was a long-term friend of the family.

The skipper held a Class 2 Deck Officer Certificate of Competency (Fishing Vessels) and had attended a Seafish⁶ safety awareness training course in 2012. He had worked as a fisherman for 30 years and had been co-owner and skipper of *Apollo* since its build in 2001.

Two of the crew were experienced fishermen and were also co-owners of the vessel. They had attended safety awareness training courses and had also been with *Apollo* since its build. One of the crew had joined in 2015 as a new entrant to the fishing industry and had completed the mandatory training courses. The Filipino crewman had been a fisherman for 6 years and had been on board *Apollo* for 6 months; he had attended a safety awareness training course in 2014.

Craig Reid was 25 years old and was slim, of muscular build and able to swim. He had been a fisherman for 10 years, all of which had been spent on *Apollo*. He had attended all the mandatory Seafish training courses.

⁵ Gilson = The winch used for the recovery of the 'cod end' of the net.

⁶ Seafish = Sea Fish Industry Authority.

Risk assessments

A number of written risk assessments had been undertaken for operations on board *Apollo*. These had been completed using the Seafish standard risk assessment forms, Issue 1 (September 1999).

One of the hazards identified when hauling nets was *Stepping up* (to perform tasks):

Activity	Hazard	Possible consequences	F/P	S	F/P x S	Control measures
Hauling nets	Stepping up (reduced rail height)	Falling overboard	1	3	3	Wear safety harness provided. Buoyancy aid to be worn at all times on trawl deck

Key: (using Seafish definitions)

F/P, Frequency/Probability (how likely that harm may occur) 1 = *Very Unlikely*

S, Severity (How harmful) 3 = *Very Harmful*

F/P x S (Risk Factor) 3 = Take action but subject to it being reasonable and sensibly possible.

This assessment had been completed by the owner in 2009 and was validated annually by him until 2014.

On 16 December 2015 a safety meeting had been held on board, during which the crew discussed “risk assessments and any further control measures, hazards etc”.

Personal Protective Equipment

The crew had been issued with constant wear PFDs (auto inflate lifejackets), flotation jackets and trousers, oilskins, helmets and working boots. In addition, safety harnesses were available on board.

Signage was prominently displayed on deck and stated: “Hard Hats and Lifejackets at all times”.

At the time of the accident none of the crew was wearing either hard hats or lifejackets; Craig was dressed in an oilskin top and trousers.

Emergency drills

MSN 1770(F)⁷ Chapter 8, paragraph 8.1.2.1, requires skippers to ensure that crew are trained in the use of all life-saving and fire appliances provided on the vessel. Further guidance is provided in MGN 430 (F)⁸. An emergency drill must be carried out monthly on all United Kingdom fishing vessels over 15m in length. The various drills required to be conducted are:

- engine room, accommodation or factory deck fire
- collision/grounding
- man overboard
- abandon ship
- emergency anchoring.

⁷ Merchant Shipping Notice (MSN) 1770 (F) The Fishing Vessels Code of Safe Working Practice for the Construction and Use of 15 metre length overall (LOA) to less than 24 metre registered length (L) Fishing Vessels:
https://mcanet.mcga.gov.uk/public/c4/solasv/m_notice/msn/msn1770.pdf

⁸ Marine Guidance Note (MGN) 430 (F) Fishing Vessels: Checks on Crew Certification and Drills:
<https://www.gov.uk/government/publications/mgn-430-fishing-vessels-checks-on-crew-certification-and-drills>

On 5 May 2015, the crew carried out a Fire and Abandon Ship drill, witnessed by an MCA surveyor, during the vessel's UK Fishing Vessel Certificate renewal survey. The surveyor discussed the vessel's manoverboard procedures with the crew at that time.

The last drill recorded in the vessel's logbook was a manoverboard drill on 8 January 2016, when the "lifebelts and smoke floats were checked".

Manoverboard recovery system

With reference to manoverboard recovery systems, MGN 430⁹ requires that:

"Crews should be well trained in the use of these systems and appreciate the limitations of the use of these recovery systems in poor weather conditions as well as fine".

Apollo was equipped with a Markus Net¹⁰ to assist man overboard recovery. The crew had not been trained in the use of this equipment and had not undertaken any practical manoverboard recovery drills.

Immersion in cold water

Sudden immersion in cold water (water under 15°C) can be fatal in a number of ways¹¹:

a. Cold shock response

On immersion in cold water the sudden lowering of skin temperature causes a rapid rise in heart rate, and therefore blood pressure, accompanied by a gasp reflex followed by uncontrollable rapid breathing. The onset of cold shock occurs and peaks within 30 seconds and lasts for 2-3 minutes. If the head goes underwater during this stage, the inability to hold breath will often lead to water entering the lungs in quantities sufficient to cause death. Cold shock is considered to be the cause of the majority of drowning deaths.

b. Cold incapacitation

Cold incapacitation usually occurs within 2-15 minutes of entering cold water. The blood vessels are constricted as the body tries to preserve heat and protect the vital organs. This results in the blood flow to the extremities being restricted, causing cooling and consequent deterioration in the functioning of muscles and nerve ends. Useful movement is lost in hands and feet, progressively leading to the incapacitation of arms and legs. Unless a lifejacket is worn, death by drowning occurs as a result of impaired swimming.

c. Hypothermia

Hypothermia occurs when the human body's core temperature drops below 35°C (it is normally about 37°C). Depending on circumstances, this can occur after 30 minutes. The body's core temperature can continue to drop even after the casualty has been recovered from the water if the re-warming efforts are not effective.

⁹ MGN 430 (F): <https://www.gov.uk/government/publications/mgn-430-fishing-vessels-checks-on-crew-certification-and-drills>

¹⁰ <http://www.manoverboardsystems.com/markus-lifenets-mob-recovery.html>

¹¹ Golden, F and Tipton, M (2002). Essentials of Sea Survival. Human Kinetics: Leeds, UK.

Previous similar accidents

In November 2008 the MAIB published its Analysis of UK Fishing Vessel Safety 1992 to 2006.

Of the 256 fatalities recorded during this period, 83 fishermen lost their lives as a result of going overboard; 65 of them happened at sea. These figures exclude persons overboard as a result of other events such as the vessel capsizing.

Most of the fatalities occurred when crew members were engaged in shooting or hauling fishing gear, or as a result of being washed overboard during heavy weather. Only one of the 65 men lost was known to have been wearing a lifejacket at the time.

The following, similar manoverboard cases have been reported to the MAIB since 2007. In the majority of these cases the person in the water was initially responsive and able to help themselves before they rapidly succumbed to the incapacitating effects of cold water:

Table showing time taken for victim to become unresponsive after entering cold water:

Vessel name	Date	Sea state	Water temperature	Victim unresponsive in water
<i>King Challenger</i>	23/06/2016	Slight	10.5°C	4 minutes
<i>Our Sarah Jane</i>	09/06/2016	Slight	12°C	8 minutes
<i>Apollo</i> , INS179	18/04/2016	Rough	9°C	7 minutes
<i>Annie T</i>	04/10/2015	Heavy swell	12°C	10 minutes
<i>Aquarius</i>	17/08/2015	Slight	14°C	10 minutes
<i>Enterprise</i>	09/07/2015	Rough	13°C	15 minutes
<i>Barnacle III</i>	13/05/2014	Slight	9°C	5 minutes*
<i>Vidar</i>	28/01/2013	Rough	8°C	11 minutes
<i>Zenith</i>	29/01/2012	Rough	8°C	10 minutes
<i>About Time</i>	16/06/2011	Moderate	12°C	Not known**
<i>Optik</i>	18/11/2009	Moderate	10°C	10 minutes
<i>Osprey III</i>	11/11/2009	Slight	10°C	12 minutes
<i>Maggie Ann</i>	12/02/2009	Moderate	6°C	8 minutes
<i>Apollo</i> , INS179	03/09/2007	Moderate	12°C	15 minutes

*mob was probably entrapped and pulled overboard and underwater by potting gear

**mob accident was not observed and body was not recovered

ANALYSIS

The fall overboard

When the shooting pole was dislodged, Craig was standing on a narrow ledge at *Apollo*'s stern, 1.0m above deck level, and he was holding onto a section of the stern gantry.

The ledge was not designed to be used as a platform and there were no dedicated hand-holds or protective barriers. However, crew members had regularly used this ledge when hauling nets, particularly in rough weather, to avoid getting their feet wet when waves were washing over the deck, as on this occasion.

It is known that there was a loud noise when the pole was violently dislodged, and that this occurred just before Craig was seen to fall from the ledge. There is no evidence to suggest that the pole hit Craig but it is thought probable that the sudden noise of the pole being pulled out and falling to the deck, combined with the movement of the vessel, caused him to lose his grip and fall to the deck.

Risk assessments

Written risk assessments for operational activities on board *Apollo* had been completed following a fatal man overboard accident on the vessel in 2007.

For the activity of hauling nets the hazard associated with 'stepping up' above deck had been identified; the control measure of the crew wearing buoyancy aids and a safety harness was not implemented. There is no evidence to suggest that the crew had ever worn safety harnesses and, although lifejackets had been used for a few years after the previous accident, the crew had not worn them in recent years.

The risk assessment for hauling nets did not refer to either when the stern doors should be opened or the removal of the shooting pole, the operation Craig was waiting to complete at the time of the accident.

Reducing / eliminating hazards

The shooting pole was needed to separate the trawl wires as they were recovered but it had to be removed before the trawl net could be hauled on to the net drum. However, no safe system of work had been identified for this task.

Guidance on applying measures to control risk identifies that some measures are more effective than others. In descending order of effectiveness, they are:

- Elimination – redesign the job to remove the hazard
- Substitution – use a less hazardous material or process
- Engineering controls – isolation and guarding
- Administrative controls – training and procedures
- Personal Protective Equipment (PPE) – only if all the measures above have been tried and found to be ineffective should PPE be used.

A more in-depth assessment of the activity of hauling nets would have identified that there was no need to open the stern doors until after the shooting pole had been removed, and that leaving them closed provided a barrier against falling overboard for any crewman standing on or near the closed bagging hatch. Had the stern doors been closed, it is also possible that Craig would not have rolled overboard after he fell. However, an in-depth assessment of the task would also have identified that the crew's main concern was getting wet from water washing over the deck, and this was the reason they were 'stepping up' onto the ledge.

Following the accident, the task of lifting out the shooting poles on *Apollo* was reviewed and mechanised by the installation of a remotely controlled winch that lifted a wire attached to the top of the pole. Substituting a winch mechanism for the manual method of removing the shooting poles was a more effective control measure than requiring the crew to wear PPE for the task as it has removed the need for a crewman to stand at the stern while hauling nets.

Cold incapacitation and the use of PFDs

Craig could swim and was apparently in good physical health, and initially he was able to hold onto the trawl wire and then a lifebuoy. However, after 7 minutes he lost the ability to grip, and soon afterwards became unresponsive and sank beneath the sea surface.

Analysis of this and previous similar accidents reported to the MAIB since 2007 shows that survival time for a person in cold water, who is not wearing a PFD, rarely exceeds 12 minutes. However, many fishermen appear to be unaware¹² that suddenly entering cold water has immediate debilitating effects on the human body, and that in man overboard situations the casualties can be incapable of helping themselves within a very few minutes. Although the cold shock response and cold incapacitation will still occur if a PFD is worn, the likelihood of the wearer surviving is greatly improved. This is because a PFD will keep the casualty's head above water without the need for them to expend energy swimming and, consequently, this reduces the load on their heart.

Between 1992 and 2006, only one of the 65 fishermen who lost their lives as a result of going overboard at sea was known to have been wearing a lifejacket at the time. Since then, campaigns to promote the wearing of PFDs, including providing them to fishermen free or at significantly reduced cost, have largely been unsuccessful¹³. *Apollo*'s crew had worn PFDs for a while following the fatal man overboard accident in 2007, but had not done so for many years prior to this accident. Consequently, while education campaigns should continue, the MAIB has recommended¹⁴ to the MCA that legislation should be introduced to mandate the wearing of PFDs on the working decks of fishing vessels.

Emergency drills

A Markus Net man overboard recovery system had been installed on board *Apollo* from new in 2001, yet when Craig fell overboard the crew attempted to recover him, first using a lifebuoy and line and then a hook rope. Despite the requirement in MSN 1770(F) for emergency drills to be conducted monthly, and the guidance in MGN 430 that "*crew should be well trained in the use of [man overboard recovery] systems*", the Markus Net had never been deployed, and it was not considered for use during the response to this accident.

¹²Turner S, et al (2009) MCA Lifejacket Wear – Behavioural Change.

¹³MAIB Report 22/2016, Report on the investigation of a man overboard from the creel fishing vessel *Annie T* (CY1) with the loss of one life, in the Sound of Mingulay, Scotland on 4 October 2015.

¹⁴Ibid, MAIB Recommendation 2016/146.

Recovering a man overboard is challenging when the casualty is conscious and able to assist the process by passing a strop over their head, manoeuvring into a recovery device such as a Markus Net, or even climbing up a ship side ladder. Once the casualty becomes unresponsive, it is highly likely either that another member of the crew will need to enter the water to facilitate the recovery, or a liferaft or boat will need to be launched for use as a platform to remove the casualty from the water. Given the speed with which a casualty immersed in cold water can become incapacitated, regular manoverboard drills are essential to ensure that the crew react swiftly and effectively to save life. In this accident, the crew did not have an adequate procedure for recovering a casualty from the water and had not undertaken practical manoverboard drills.

CONCLUSIONS

- The shooting pole was needed to separate the trawl wires as they were recovered and it had to be removed before the trawl net could be hauled on to the net drum. However, no safe system of work had been identified for this task.
- Craig fell overboard while undertaking a task for which no safe system of work had been identified.
- Craig could swim and was in apparently good physical health. Despite this, the effects of cold water incapacitation resulted in him being unable to hold on to a lifebuoy after 7 minutes in the water.
- Craig's chances of survival once in the water were reduced as he was not wearing a PFD.
- The crew had no adequate procedure for recovering a casualty from the water and had not undertaken practical manoverboard drills.
- The majority of fishermen appear to be unaware of the rapid and debilitating effects of cold water incapacitation.
- The crew had worked on deck for the last few years without PFDs or safety harnesses, despite these having been identified as necessary by risk assessments undertaken following a fatal accident on the same vessel in 2007.

ACTION TAKEN

MAIB actions

The **Marine Accident Investigation Branch** has published a safety flyer to disseminate the key lessons of this accident to the fishing industry.

Actions taken by other organisations

The Maritime and Coastguard Agency, fishing industry federations, Seafish and the RNLI have agreed to undertake a coordinated safety campaign focused on the difficulties of manoverboard recovery.

The **Maritime and Coastguard Agency** has undertaken to make the wearing of PFDs on the exposed decks of fishing vessel's mandatory by 2020.

The **Blue Motion Fishing Company Ltd** has:

- Introduced a mechanical system for lifting the shooting pole to avoid the need for a crewman to lift it from its housing.
- Issued each crewman with an ISO 12402 PFD and mandated that the crew wear their PFD and hard hat when working on deck.
- Purchased and trained the crew in the use of a new man overboard recovery system.
- Re-emphasised to the crew that safety harnesses and lanyards must be worn when working in elevated or exposed locations on board.

RECOMMENDATIONS

The **Blue Motion Fishing Company Ltd** is recommended to:

- 2016/148** Review its risk assessments and develop safe systems of work to minimise the risks to its crews when working on deck.
- 2016/149** Ensure that realistic manoverboard drills are carried out to prepare the crew for the challenge of recovering a non-responsive person from the water in a timely manner, particularly in adverse weather conditions.

Safety recommendations shall in no case create a presumption of blame or liability

SHIP PARTICULARS

Vessel's name	<i>Apollo</i>
Flag	United Kingdom
Classification society	Not applicable
IMO number/fishing numbers	INS 179
Type	Stern trawler
Registered owner	Blue Motion Fishing Co Ltd
Manager(s)	Not applicable
Year of build	2001
Construction	Steel
Length overall	23.95m
Registered length	22.37m
Gross tonnage	246
Minimum safe manning	Not applicable
Authorised cargo	Fish

VOYAGE PARTICULARS

Port of departure	Kinlochbervie, Scotland
Port of arrival	Scrabster, Scotland
Type of voyage	Coastal
Cargo information	Fish
Manning	6

MARINE CASUALTY INFORMATION

Date and time	18 April 2016 0630, UTC+1
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	30nm WNW of Noup Head, Orkney
Place on board	Stern
Injuries/fatalities	One fatality
Damage/environmental impact	Not applicable
Ship operation	Fishing – Hauling
Voyage segment	Mid-water
External & internal environment	Wind: West force 8 Sea State: Rough Visibility: Good Sea temperature: 9°C
Persons on board	6