ACCIDENT REPORT

Report on the investigation of

a fatal manoverboard from the fishing vessel

Zenith (B 470)

29 miles south-east of Kilkeel

on 29 January 2012

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 4/2013 JANUARY 2013

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 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.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ANIFPO	-	Anglo Northern Irish Fish Producers' Organisation
C	-	Celsius
CSR	-	Cold Shock Response
FISG	-	Fishing Industry Safety Group
FVSO	-	Fishing Vessel Safety Officer
LOA	-	Length Overall
m	-	metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MOB	-	Manoverboard
MRCC	-	Maritime Rescue Co-ordination Centre
MSN	-	Merchant Shipping Notice
NFFO	-	National Federation of Fishermen's Organisations
OAN	-	Operations Advice Note
PFD	-	Personal Flotation Device
RNLI	-	Royal National Lifeboat Institution
SCOTNI	-	Scottish and Northern Ireland region of the MCA
Seafish	-	Commonly used short title of the Sea Fish Industry Authority
SFF	-	Scottish Fishermen's Federation
SI	-	Statutory Instrument
UK	-	United Kingdom
UKFVC	-	United Kingdom Fishing Vessel Certificate
UTC	-	Universal Time, Co-ordinated

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

Zenith

SYNOPSIS

On 29 January 2012 a fisherman was swept overboard from the twin rig trawler *Zenith* during a routine net hauling operation in the Irish Sea. The crew reacted swiftly to the situation and the skipper skilfully manoeuvred his vessel back alongside the casualty. However, the fisherman was not wearing a lifejacket and the crew had no suitable equipment available to hold him alongside whilst his recovery was effected. Subsequently, despite their efforts, the casualty slipped from his rescuers' reach and was lost.

The accident was a consequence of the unsafe practice of crew standing on the aft bulwark top rail during initial net hauling, which had become customary in favourable sea conditions. The vessel's owners had not carried out a safety evaluation of their working operations nor had they carried out emergency drills. Therefore, neither the dangers associated with standing on top rails, nor the crew's unpreparedness for rescuing incapacitated persons from the sea was fully recognised.

As a result of this and other recent accidents, the Maritime and Coastguard Agency has taken measures designed to ensure that post-accident surveys and inspections are more robust where working practices might have played a part in fatal accidents. However, the Agency has been recommended to further strengthen its procedures for renewal and intermediate surveys of fishing vessels to ensure that the effectiveness of emergency drills and crew training certificates are routinely observed by its surveyors.

The Anglo Northern Irish Fish Producers' Organisation has implemented vessel auditing procedures, which will offer a review of operational practices to its associate members.

A recommendation has been made to the owners of *Zenith* which seeks to improve the overall safety of their crews.

A recommendation has also been made to the Sea Fish Industry Authority regarding facilitation of practical assistance for fishermen in the development of risk assessments.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *ZENITH* AND ACCIDENT

SHIP PARTICULARS

Vessel's name	*Zenith*
Flag	UK
Classification society	Not applicable
Fishing numbers	B470
Type	Trawler
Registered owner	Privately owned
Manager(s)	Not applicable
Construction	Carvel planked, larch on oak frames
Length overall	21.42m
Registered length	20.37m
Gross tonnage	116
Minimum safe manning	Not applicable
Authorised cargo	Fish

VOYAGE PARTICULARS

Port of departure	Kilkeel
Port of arrival	Kilkeel
Type of voyage	Fishing
Cargo information	Fish
Manning	6

MARINE CASUALTY INFORMATION

Date and time	29 January 2012 at about 1240
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	29 nautical miles SE of Kilkeel
Place on board	Aft deck
Injuries/fatalities	One fatality
Damage/environmental impact	None
Ship operation	Twin-rig trawling
Voyage segment	Not applicable
External & internal environment	Wind southerly force 7 (Beaufort) 3m wave heights
Persons on board	6

1.2 NARRATIVE

1.2.1 Background

When fishing, *Zenith* towed two nets on the seabed (twin-rig trawling), connected to the vessel by three trawl warps or wires **(Figure 1)**. The port and starboard wires led to otter boards, or trawl doors, which kept the mouths of the nets open by spreading the net wings apart. A third central wire was shared by the inner wing of each net and was fastened to a heavy chain weight, known as a clump, that kept the middle of the arrangement on the sea bed. Abaft of the trawl doors and clump, the wing ends of the nets were attached by bridles which dragged over the sea bed, guiding the catch towards the nets.

During the hauling process the vessel would be steamed slowly ahead as the gear was winched towards the vessel. Once the otter boards and clump had been retrieved alongside, the bridles would be transferred to the net drums by means of a pennant arrangement, enabling the nets to be wound onto the drums. Finally, the engine would be taken out of gear for retrieving the cod end.

It was not uncommon for bridles and nets to build up unevenly and collapse upon themselves while being wound onto the drums, causing them to subsequently become entangled during shooting. To prevent this build-up, the skipper would either steer *Zenith*'s stern into the nets, or two deckhands would manually push the bridles and wing ends apart for the first three or four turns of the net drums, monitored by the net drum controller. This operation required the deckhands to place themselves abaft the net drums and work with their arms at full stretch over their heads. However, when the weather permitted, it had become the custom for them to make access to the gear easier by standing on the transom bulwark top rail to spread the bridles and net wing ends apart.

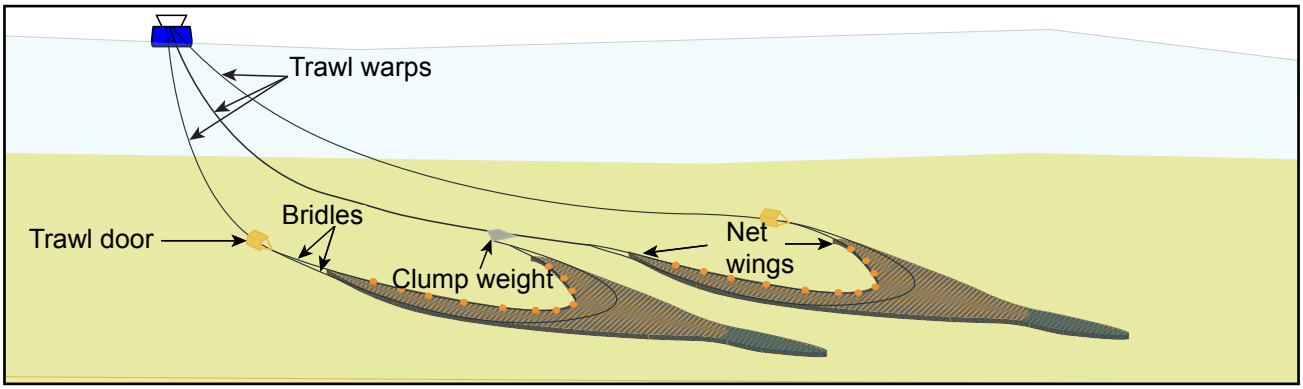

Figure 1: Diagrammatic representation of twin rig trawling

1.2.2 Environment

The wind was southerly Beaufort force 6 to 7, with a northerly setting tide of less than 1 knot. The sea state was described as moderate with up to 3 metre (m) wave heights and a sea surface temperature of 8°C.

1.2.3 The accident

At 1230 on 27 January 2012, *Zenith* sailed from her home port of Kilkeel on a 5-day twin-rig prawn[1] trawling trip. She reached her chosen fishing grounds at 1400, where she shot away her nets and commenced fishing.

Zenith's six-man crew hauled and shot the nets five times over the following 41 hours, sorting the catch and resting between hauls.

On her first daylight haul of 29 January, *Zenith* towed towards the far southern end of her fishing grounds, directly into the wind, and commenced hauling at about 1230.

The skipper initially hauled with the vessel heading into wind and tide and, as the trawl warps were winched in, he gradually allowed the vessel to veer to starboard so that by the time the trawl doors came up to the gallows, she was almost abeam to the wind and seas. The trawl doors and chain clump were secured to their stowage points and the bridles were transferred to the net drums. The skipper then brought the vessel around before the wind and sea so that the actual recovery of the nets onto the net drums would be more comfortable for the crew.

Zenith's crewmen were in the positions indicated in **Figure 2**. The skipper was in the wheelhouse, a deckhand controlled the trawl winch forward, another prepared the gilson hook on the starboard side deck for recovering the cod end, a third controlled the net drum from the aft starboard side deck, while the two remaining crewmen were stationed on the aft deck to disconnect bridles from behind the trawl doors and attach them to the net drums using the pennants.

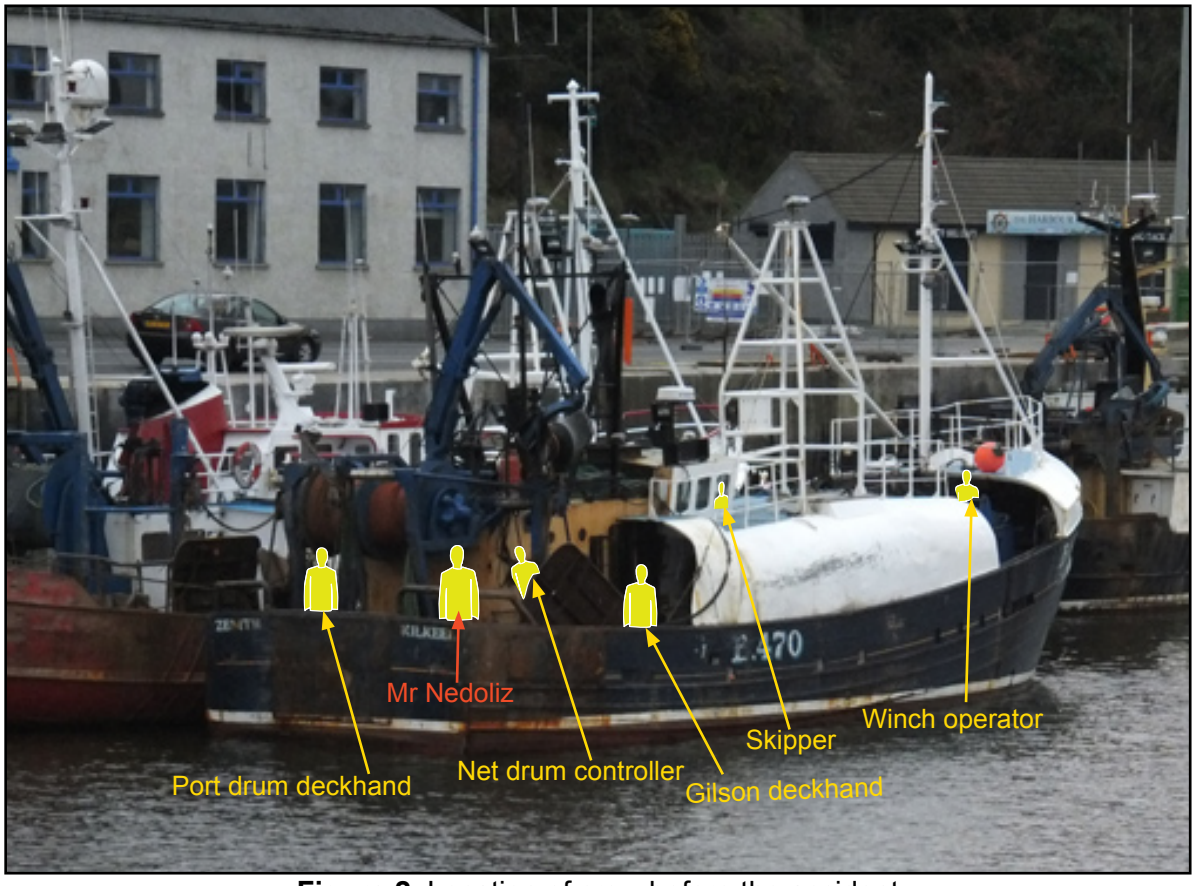

Figure 2: Location of crew before the accident

[1] Prawn: a colloquial term for *Nephrops Norvegicus;* also referred to in the UK as Dublin Bay prawns, Norway lobster and langoustine

As the sea conditions were moderate, the skipper intended to guide the nets onto the drums by steering *Zenith*'s stern into them, avoiding the need for manual guidance by the crew. However, he did not communicate this intention to the crew, assuming they would recognise this from the sea state and the positioning of the vessel relative to wind and sea.

Once the bridles were transferred onto the net drums, the net drum controller proceeded to wind them onto the drum barrels. On the starboard side, Nikolai Nedoliz stood up onto the transom bulwark top rail, with his back towards the sea, and commenced pushing the bridles apart from that position **(Figure 3)**. A large wave, of greater height than had thus far been encountered that day, was seen rising astern by both the net drum operator and the crewman on the port side drum. They shouted forcefully to Mr Nedoliz several times to get down from the top rail. However, Mr Nedoliz looked uncomprehendingly at his colleagues and remained in position. The wave swamped the vessel's stern and carried Mr Nedoliz from the top rail and into the sea.

Figure 3: Position of casualty at time of being swept overboard

1.2.4 Post-accident

The net drum controller immediately shouted to the skipper that Mr Nedoliz had gone overboard, and threw a nearby life-ring into the sea. It landed about 2m from the man in the water. The skipper placed *Zenith*'s engine into neutral and ran to the stern, where he saw Mr Nedoliz on the surface about 7m astern. His face was blue

and he appeared to be swimming weakly in a position between the life-ring and the starboard net floats **(Figure 4)**. As the life-ring had no lanyard attached, the men shouted to their colleague to swim to the net floats in the hope that once he had a hold of them they could simply wind the net onto the drum and retrieve him back on board. However, Mr Nedoliz appeared unable to swim the short distance to the nets and they were soon driven beyond his reach by the following seas.

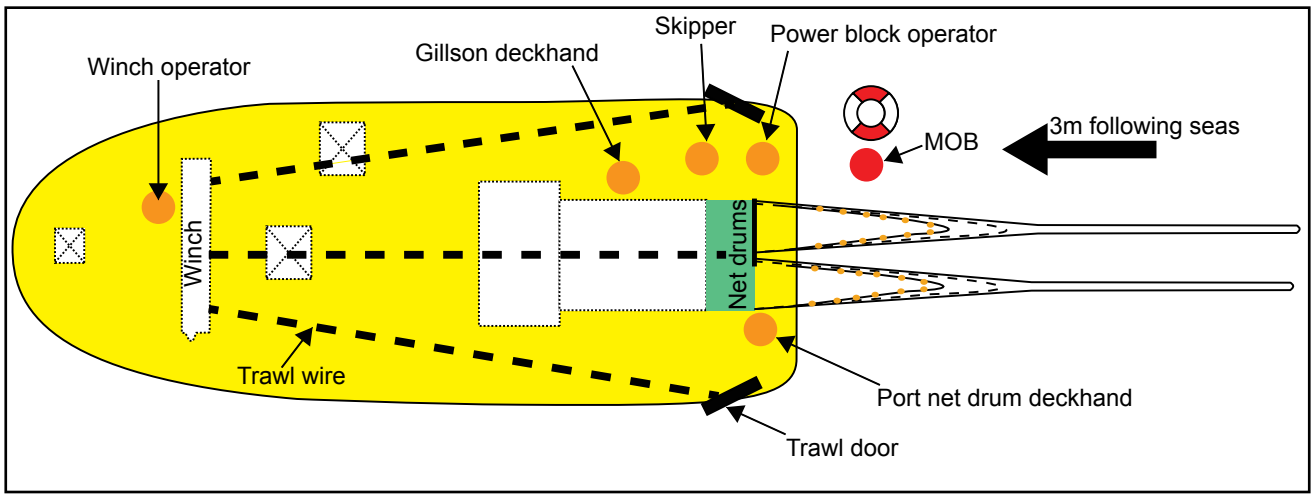

Figure 4: Diagrammatic representation of crew positions and MOB relative to vessel, nets etc

The skipper ran to the wheelhouse, from where he manoeuvred the vessel, with the trawl nets streaming astern, in an elliptical turn back around towards Mr Nedoliz. He then skilfully placed the vessel with the casualty to leeward between the whaleback and gutting shelter, and two crewmen quickly reached down to Mr Nedoliz with a prawn rake (an implement of just over 2m in length for distributing catch onto the sorting table) **(Figure 5)**. Mr Nedoliz was suspended vertically in the sea, his face was bluish purple in colour, his eyes appeared glazed and he made no attempt to reach for the rake despite his colleagues' shouted instructions. In an attempt to keep Mr Nedoliz alongside, the blade of the rake was positioned under one of his arms. However, as this was done, his arm lifted vertically, causing him to slip off the rake and disappear below the surface. Mr Nedoliz did not resurface.

1.2.5 The search

Zenith's skipper notified the coastguard and other fishing vessels in the area of the accident. Dublin Maritime Rescue Co-ordination Centre (MRCC) co-ordinated the subsequent search for Mr Nedoliz using a coastguard helicopter, two Royal National Lifeboat Institution (RNLI) lifeboats and nine fishing vessels. The search continued until the light faded at 1715, and was resumed during daylight hours for the next 3 days. However, there was no sign of Mr Nedoliz, and all searching was officially terminated at 1700 on 1 February.

Mr Nedoliz's body was recovered in a trawler's nets several weeks later. Postmortem results showed the cause of death to be drowning.

1.3 CREW

Zenith was manned by a crew of six.

Figure 5: Showing the position where the casualty was taken alongside and the implement used to attempt to retain him alongside

1.3.1 Skipper

The 48 year old skipper was the managing owner of *Zenith*. He had fished all his working life and had owned and been the skipper of various fishing vessels prior to becoming part owner and skipper of *Zenith* in 2004.

He held a Class 2 (fishing) Certificate of Competency and all four mandatory training certificates required by the Fishing Vessels (Safety Training) (Amendment) Regulations 2004, including Safety Awareness and Risk Assessment.

1.3.2 The casualty

Ukrainian national Mr Nikolai Nedoliz was 35 years old and was working in the UK under a false name and passport. He had fished on *Zenith* for 3 years and on board other trawlers before that. The only mandatory training certificate he held was the Seafish validated, 1 day attendance course in Safety Awareness and Risk Assessment, obtained in February 2009 under his alias.

Mr Nedoliz was described as hard working but uncommunicative, although he was said to have spoken good English. He was believed to be in good health, appeared very fit, had a powerful physique and was careful about his diet.

Mr Nedoliz was dressed in conventional clothing covered by a top layer of oilskin trousers and oilskin jacket. His clothing offered no particular thermal protection against immersion and he wore no personal flotation device (PFD) such as an inflatable lifejacket or buoyancy aid.

1.3.3 Other crew members

Of the remaining four crew, two had been fishing for over 20 years and held two (*Safety Awareness and Risk Assessment* and *First Aid*) of the four mandatory safety training certificates, while the other two crew members (with 6 years and 1 year fishing experience respectively) held none of the required safety training certificates.

1.4 *ZENITH*

Zenith (original name, *Lindisfarne)* was built in 1972 as a seine netter and side trawler. Over time, she underwent various modifications including being re-engined and adapted for seine netting only in 1987. This involved the removal of her trawl equipment, extending the deckhouse aft, and fitting a gutting shelter. For this major modification a new stability book was produced that took account of the amended weights on board and the vessel's new displacement.

In 1996, two of her current owners acquired the vessel, renamed her *Antares,* and converted her to twin-rig stern trawling. This major conversion included replacing the seine net winch with a much heavier trawl winch, the construction of outrigger type trawl gallows, and the installation of a double net drum. Due to the reduced area of the aft deck resulting from the 1987 deckhouse extension, there was no room to place the net drum on the aft deck, so it was suspended from the aft side of the deckhouse above head level. This left about 0.6m between the net drum's supporting legs and the transom bulwark **(Figure 6)**. The owners did not inform the MCA of this major modification, as required by The Fishing Vessels (Safety Provisions) Rules 1975, and they did not have the vessel's stability re-assessed.

Figure 6: Showing distance between net drum supporting legs and transom = 0.6m

Antares underwent UK Fishing Vessel Certificate (UKFVC) surveys in 1996, 2000 and 2004 during which the modifications of 1996 went unnoticed by the attending surveyors. The 2004 UKFVC renewal survey was protracted as *Antares* was detained for several weeks for having numerous serious defects, including the lack of manoverboard (MOB) retrieval equipment. During this period her name was changed to *Zenith,* her current skipper became an owning partner and he took over operational management of the vessel. The vessel was released from detention once the deficient items had been brought up to the standard required by the survey. This included the fitting of a *Lalizas* MOB retrieval system **(Figure 7)**.

Figure 7: Lalizas manoverboard recovery equipment

At the time of *Zenith*'s UKFVC renewal survey in March 2009, a routine light ship stability check revealed she did not comply with stability requirements and that her stability book was invalid. *Zenith* then underwent an inclining test, which showed that her catch-carrying capacity should be restricted by about 42% and that 4.5 tonnes of ballast needed to be added to compensate for the additional top weight of the 1996 modifications. A short term certificate was issued on condition that these changes were implemented, but a full term certificate could not be issued until an up-to-date stability book was produced. *Zenith* sailed on several replacement short term certificates until March 2011, when a stability book was produced and the full term certificate was issued.

1.5 ONBOARD TRAINING AND DRILLS

Fishing vessels of *Zenith*'s length are required by 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 (the 15-24 Code)*, to carry out onboard crew training and emergency drills. These vessels are also required by the *Merchant Shipping (Official Log Books) (Fishing Vessels) Regulations 1981*, to have these items recorded and witnessed in their Official Log Book, which should then be returned to an MCA marine office every 6 months for inspection. The MCA has seldom enforced this requirement, and there was no record of emergency drills having been carried out on board *Zenith* at any time.

At times of survey or intermediate survey for a UKFV certificate, crews are also required to be observed carrying out an emergency drill. The MCA promulgated the requirement to its surveyors through Operations Advice Note (OAN) 673 and to fishermen through MGN 430. Nine days after the accident, *Zenith* underwent an intermediate survey, but the attending surveyor did not witness a complete emergency drill.

1.6 POST-ACCIDENT ACTIONS

Two days after the accident, the MCA carried out a targeted inspection of *Zenith* and her safety equipment. This inspection highlighted 12 deficiencies relating to the 15-24 Code, which were of such a nature that they had to be rectified before the vessel was permitted to sail. The inspection also identified that five of the six crew members were deficient in mandatory safety training. This prompted a check on the owners' other vessels, which revealed similar training deficiencies. The Sea Fish Industry Authority (Seafish) has confirmed that from the date of the accident on board *Zenith,* through to mid April 2012, the number of trainees who attended mandatory safety courses in the fishing communities around Kilkeel nearly doubled compared with the same period for the previous year.

During the targeted inspection, the MCA gave notice that *Zenith*'s intermediate survey for her UKFV certificate would take place on 7 February 2012. This survey identified that the skipper's annual self-certification declaration had not been completed to confirm that the vessel still complied with the 15-24 Code, and there were a further 11 deficiencies that required corrective action before the vessel could leave port. The skipper had not been advised to have his crew in attendance, so it was not possible to witness a complete drill.

1.7 RISK ASSESSMENT

The *Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulation 1997 (1997, SI. 2962)* requires that fishing vessel owners carry out a risk assessment of their vessels' working operations, and review it at regular intervals. *Zenith*'s skipper was unable to produce a risk assessment to MAIB inspectors following the accident. He did present a historic Seafish risk assessment pro-forma to MCA surveyors during their post-accident inspection. However, the risk assessment had not been endorsed to show that it had been reviewed.

1.8 PERSONAL PROTECTIVE EQUIPMENT

The *Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999 regulations* (summarised in MSN 1731 (M+F)) require employers to provide personal protective equipment to their workers **(Annex A)**.

MGN 311 (F), Working and Protective Gear for Fishermen gives further guidance and provides a comprehensive matrix of working activities, with a checklist of PPE for differing hazardous situations **(Annex B)**. The matrix highlights the wearing of lifejackets as a high priority/essential item while working on deck, with the wearing of a safety harness and lanyard as a priority, dependent upon the circumstances and the location of activity. This is reiterated in MSN 1731 (M+F), which additionally requires a lifebuoy, with a line attached for immediate use, and an appropriate lifejacket, to be provided when any work is carried out from a position where there is a reasonably foreseeable risk of falling overboard.

Zenith's owners did provide her crew with readily available constant wear inflatable lifejackets **(Figure 8)**, but these were seldom worn by her crew and were not worn by Mr Nedoliz.

Figure 8: Inflatable lifejackets which were available onboard *Zenith*

1.9 SIMILAR ACCIDENTS

The MAIB has investigated numerous fatal accidents involving crew going overboard from fishing vessels. A common theme in many of these accidents has been the difficulty the crew experienced in recovering the casualty back on board. A few of the accidents bearing similarities to the one that occurred on *Zenith* include:

- 9 October 2010, a crewman was dragged overboard by fishing gear from *Flying Cloud*[2]. His colleagues had great difficulty in recovering him back on board although he was still alive when initially retrieved alongside the vessel.

- 11 November 2009, a crewman was dragged overboard from *Osprey III*[3]. His colleagues were unable to recover him on board despite him being alive alongside the vessel for several minutes.

- 6 November 2009, a crewman standing on a catch sorting tray almost level with the bulwark top rail, fell overboard from *Korenbloem*[4]. Two crewmen jumped overboard in rough sea conditions and, with the help of colleagues, recovered the casualty back on board. However, the casualty did not survive.

- 12 February 2009, a crewman was lost from the fishing vessel *Maggie Ann*[5] when he went overboard while standing on a bulwark top rail during a routine hauling operation.

- 13 September 2007, a crewman was dragged overboard from *Apollo*[6]. The crew had great difficulty in recovering him back on board despite him being alive when initially taken alongside the vessel.

No form of PFD was worn by any of the casualties in these accidents.

During the period 2000-2011 (inclusive) 34 fatal MOB accidents occurred from UK registered fishing vessels during normal deck working operations[7] where the casualties were not wearing any form of PFD.

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[2] PE summary of a fatal manoverboard from FV *Flying Cloud*, 0.1 mile S of Burra Voe, 9 October 2010: www.maib.gov.uk/publications/completed_preliminary_examinations/completed_preliminary_examinations_2010/flying_cloud.cfm

[3] Report on the investigation of a fatality resulting from a man overboard from FV *Osprey III*, Moray Firth, 11 November 2009: www.maib.gov.uk/publications/investigation_reports/2010/trilogy.cfm

[4] Report on the investigation of fatality resulting from a man overboard from FV *Korenbloem*, Dover Strait, 6 November 2009: www.maib.gov.uk/publications/investigation_reports/2010/trilogy.cfm

[5] Report on the investigation of a fatal manoverboard accident from FV *Maggie Ann*, Cardigan Bay, 12 February 2009. www.maib.gov.uk/publications/investigation_reports/2009/maggie_ann.cfm

[6] PE summary of a fatal manoverboard from FV *Apollo*, 85 miles NE of Peterhead on 03 September 2007: www.maib.gov.uk/publications/completed_preliminary_examinations/completed_preliminary_examinations_2007/apollo.cfm

[7] i.e. not including MOB fatalities resulting from a casualty to the vessel such as capsize or foundering. Also not including fatalities in port or harbour.

1.10 PREVIOUS RECOMMENDATIONS

The MAIB's Analysis of UK Fishing Vessel Safety 1992 to 2006 made recommendation (2008/173) to the MCA that included:

- As a consequence of the unacceptable levels of fatal MOB accidents involving fishermen:

  Review international safety initiatives and transfer best practice to the UK fishing industry with particular reference to the use of PFDs and Personal Locator Beacons.

This recommendation was reiterated to the MCA in the investigation report of a fatal manoverboard accident on board **FV *Maggie Ann*** in 2009 (2009/158).

- As very few skippers were found to adhere to the requirement for carrying out onboard training and drills:

  Ensure that current mandatory training requirements for fishermen are strictly applied.

The MCA accepted these recommendations.

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 OVERVIEW

Nikolai Nedoliz lost his life while carrying out an intrinsically unsafe task which had become custom and practice on board *Zenith* over time. The task of manually spreading the bridles and net wings apart during hauling was only carried out to speed up the following shooting process and did not need to be carried out at all.

It is possible that Mr Nedoliz was already unconscious or drowned by the time *Zenith* was manoeuvred back alongside him, and that he was being supported by air trapped in his clothing. The raising of his arm probably allowed some of the trapped air to escape from his oilskins, causing him to slip below the sea.

2.3 VESSEL MODIFICATIONS

Zenith underwent major modifications in 1996, including the installation of a twin barrelled net drum high above deck level. These modifications were completed without the knowledge or approval of the MCA as required by the Fishing Vessels (Safety Provisions) Rules 1975. This requirement is in place to ensure that the MCA is able to consider potential stability or operational issues resulting from modifications. When *Zenith*'s stability was finally tested some 13 years later, the vessel needed significant additional ballast, a reduction in catch-carrying capacity, and revised stability documentation to comply with regulation.

In 1987, *Zenith*'s deckhouse had been extended aft. Consequently, there was insufficient space to fit a net drum on the deck, and in 1996 when the vessel was converted to stern trawling the net drum was positioned above the deck, on supporting legs. As a result of the height of the net drums and the short aft deck, the height of the bridles and nets during retrieval was well above the bulwarks. This prevented the use of vertical guide poles to initially guide the gear onto the drums, as used by many other vessels with lower drums **(Figure 9)**. Nevertheless, there are many examples of similar arrangements whereby skippers manoeuvre their vessels during retrieval in such a way as to ensure that nets feed onto the drums evenly without the need for manual intervention by the crew. It was unsafe for a man to stand on the bulwarks to feed the bridles and nets onto the net drum, and an alternative system, that did not require manual intervention, should have been devised.

2.4 WORKING PRACTICES

Zenith's six-man crew had a great deal of experience of working with her fishing gear. The vessel had operated without significant incident since the vessel's conversion to twin rig trawling in 1996. Getting onto the top rail to spread the bridles was a practice that crews had evolved since 2004 to reduce the possibility of uneven build up of the gear on the drums and the risk that the unbalanced turns

Image courtesy of www.trawlerphotos.co.uk

Figure 9: Stern trawler showing example of a deck mounted net drum with guide poles in place

would subsequently collapse and entangle the nets, causing subsequent delays during shooting. Although standing on the top rail to guide the bridles and net wings onto the drums was the deckhands' chosen way of working, it was known about and condoned by the skipper. There was no need to stand on the top rail to push the gear apart, but it made the task somewhat easier than when the crew attempted to do so from the deck.

The practice of working from the top rail was clearly unsafe, and it was only a matter of time before it led to an accident. Falling from the rail into the sea or onto the deck was not the only danger this task presented; the act of manually pushing bridle wires and net wings apart as they wound on to the net drum could also have resulted in being dragged into the revolving drums.

The hazards of working on the top rail would have been recognised if an appropriate risk assessment had been carried out as required by the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997. It is difficult to understand why the crew were willing to carry out this clearly dangerous operation without bringing it to the attention of the skipper and seeking alternative means to reduce delays during shooting. This is especially surprising since the skipper and three of the crew, including the casualty, had attended mandatory *Safety Awareness and Risk Assessment* training courses.

The crew members' regular practice of standing on the bulwark top rail was also in contravention of the Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Work at Height) Regulations 2010, which prohibit working where a person could fall a distance liable to cause personal injury.

2.5 THE CASUALTY

Mr Nedoliz climbed on top of the bulwark rail to simplify a task that was unnecessary, and in any event could have been carried out safely from the deck. He did not get down from the rail when his colleagues shouted to him to do so. It is unknown why he ignored his colleagues; perhaps he had carried out the operation so many times previously, without having suffered any ill effects, that he had lost recognition of the danger. Alternatively, he might have been dismissive of his colleagues' warnings and considered himself capable of dealing with the situation. In any event, Mr Nedoliz demonstrated complete indifference to his personal safety by voluntarily continuing to stand on the top rail and ignoring his colleagues' shouts to get down.

Following Mr Nedoliz being swept from the top rail and resurfacing behind *Zenith*, his face was described as being blue/purple in colour and his attempted swimming was seen to be ineffective and weak. He should not have succumbed to hypothermia in the relatively short time it took *Zenith* to get back to the casualty. Therefore, it is probable that he had inhaled water during his immersion, possibly due to gasp reflex and suffered additional elements of cold shock response (CSR).

The effects of immersion and CSR upon Mr Nedoliz would appear to be almost identical to those of the fatal MOB from FV *Maggie Ann* on 12 February 2009. Professor Mike Tipton's comments on that fatality are reiterated at **Annex C**.

Without wearing a PFD Mr Nedoliz would have struggled to remain afloat, exacerbating the effects of CSR.

2.6 TRAINING

The skipper was the only crew member on *Zenith* to have undertaken all the mandatory safety training as required by the Fishing Vessels (Safety Training) (Amendment) Regulations 2004. Additionally, crew members on *Zenith*'s owners' other vessels were also lacking the necessary mandatory safety training. It was the responsibility of the skippers and owners to ensure that their crew members had undergone this training. The fact that this was not done is perhaps a reflection of their collective attitude towards health and safety issues.

It is of note that Seafish confirmed a dramatic increase in the number of trainees attending its safety courses in the Kilkeel area immediately after the accident. This further confirmed that many local fishermen were ignoring the regulatory training requirements, and that this accident had either had some influence upon them personally, or on vessel owners who might have recognised the potential threats of prosecution and/or invalidation of insurance policies for non compliance with regulation.

2.7 EXTERNAL ASSISTANCE WITH RISK ASSESSMENT

Between the years 2005 and 2007 the Scottish and Northern Ireland (SCOTNI) region of the MCA employed a Fishing Vessel Safety Officer (FVSO), with a fishing background, to assist over 15m vessel crews with completing formal risk assessments. This initiative was successful in clarifying and simplifying the perceived complications surrounding the task and also gave crews a feeling of ownership of the completed assessments. Unfortunately, financial restrictions prevented this initiative from continuing, despite its success.

Following cessation of the initiative by the MCA, similar assistance was then offered by Seafish, until it too became the victim of financial pressures.

The loss to industry of such interventions had been recognised by at least one group within the fishing industry. In an effort to provide self-help, the Scottish Fishermen's Federation (SFF) has offered its associate member skippers practical assistance with completing risk assessments free of charge since May 2012.

Zenith belonged to the Anglo Northern Irish Fish Producers' Association (ANIFPO), which is an associate member of the National Federation of Fishermen's Organisations (NFFO). Unlike the SFF, neither ANIFPO nor NFFO offer their members assistance in completing formal risk assessments.

In order to ensure that fishermen work in the safest possible conditions, it is essential that the requirements regarding the assessment of risks are complied with, and that the value of these assessments is understood by all crews. The assistance previously offered by the MCA and Seafish, and currently the SFF, has proven to be instrumental in achieving this and should be extended to the industry as a whole.

2.8 EMERGENCY DRILLS

Historically, very few skippers have complied with the regulations regarding onboard emergency training and, as a result, a very small number of fishermen have experienced the benefit of dedicated training and emergency drills on their own vessels. *Zenith* was no exception to this, and no training or drills for emergencies had been carried out on board the vessel.

In recognition of the fishing industry's lack of onboard emergency training and drills, the MAIB's Analysis of UK Fishing Vessel Safety 1992 to 2006, made a recommendation to the MCA to: *ensure that current mandatory training requirements for fishermen are strictly applied*.

The MCA accepted this recommendation and developed a policy of observing drills at renewal and intermediate surveys to ensure that at least once every 3 years, an emergency drill, such as a MOB, was carried out. This policy was promulgated to surveyors through Operations Advice Note (OAN) 673 in September 2009, about 6 months after *Zenith*'s renewal survey of March 2009, and to the fishing industry through MGN 430 in January 2011. OAN 673 also reiterated the need for surveyors to witness all crew members' training certification as per the Fishing Vessels (Safety Training) Regulations 1989.

Within days of the accident, the MCA carried out a targeted inspection of *Zenith*. The skipper was informed that a UKFV intermediate inspection was due, and this was conducted 1 week later. However, the skipper was not notified to have his crew

in attendance, and so it was not possible for the attending surveyors to witness a complete manoverboard drill. This might have been an oversight, but it is of concern given that a man had just lost his life in circumstances where training and experience in emergency situations could have saved him.

In addition to the MCA's own requirement to observe drills during survey, the 15-24 Code requires fishing vessel skippers to carry out onboard training and drills monthly, and to record and witness that they had done so. Due to a lack of resources within the MCA, this requirement had seldom been enforced. However, the requirement of the 15-24 Code remains, and had such training and drills been carried out on *Zenith* it would almost certainly have improved the crew's and vessel's preparedness for such an emergency.

Issues likely to have been identified through onboard training and drills included:

- The life-ring thrown to Mr Nedoliz was missing a lanyard, so would not have enabled him to have been pulled back alongside had he been able to reach it.

- The vessel was not equipped with a boat hook or any other means of holding an incapacitated casualty alongside.

- There was no plan for the recovery of either a conscious or an incapacitated casualty from the water.

- The vessel had been equipped with *Lalizas* MOB retrieval equipment some 8 years earlier, but the skipper or crew were not aware the equipment was on board.

A more robust approach by the MCA to enforcing the requirements for onboard training and drills would demonstrate to the industry that poor attitudes to safety are not acceptable.

2.9 WEARING OF PFDS

Although the provision of lifejackets or other PFDs on board Zenith was mandatory, legislatively there was no requirement for the crew to wear one when working on deck. However, that did not prevent the owners from identifying such need under their duty of care, and insisting that PFDs were worn on board their vessels. Zenith's owners did make inflatable lifejackets available, but made no obligation upon crew members to wear them.

As highlighted in Professor Mike Tipton's report (included at **Annex C)**, had the casualty been wearing an appropriate PFD it would have dramatically increased his chances of survival by:

- Helping keep his airway and face clear of the water.

- Decreasing cooling effects due to additional insulation from the PFD.

- Reducing the need to expend energy on staying afloat with fewer periods of head immersion.

- Decreasing cardiac workload due to the reduced need to expend energy staying afloat.

- Increasing detection and enabling more effective means of recovery.

The MAIB's Analysis of UK Fishing Vessel Safety 1992 to 2006 highlighted the high number of fatalities resulting from MOBs from fishing vessels, and made a recommendation to the MCA to: *Review international safety initiatives and transfer best practice to the UK fishing industry with particular reference to the use of PFDs and Personal Locator Beacons*. This recommendation was accepted by the MCA. However, since that time, financial constraints have prevented the MCA from carrying out the proposed research into international best practice. Nevertheless, the MCA has worked consistently with the Fishing Industry Safety Group (FISG) towards introducing a mandatory requirement for PFDs to be worn on fishing vessels' external working decks, and for PLBs to be carried while fishing single handedly. Indeed, this has been widened to give consideration to wearing safety lines on deck as a substitute for PFDs.

In view of the ongoing revision of the three fishing vessel Codes (<15m vessels, 15-24m vessels and >24m vessels), and the potential legislative impact of this revision, the MCA has, in consultation with the FISG, agreed to a period of grace before implementing mandatory wearing of PFDs or lifelines on open decks. In consideration of its integral role with industry, the FISG is to be allowed time to stimulate culture change and promote voluntary wearing of PFDs or lifelines. If, after review, it becomes clear that this is not having the desired effect (by reducing the number of MOB fatalities) the MCA will invoke regulatory steps for PFD wearing. Such regulation has been embedded in Iceland's fishing structure for several years, where deaths from MOB incidents have recently been eliminated.

In the absence of such a legal requirement, the owners of *Zenith* and all other fishing vessels should set their own standards, and insist on the wearing of PFDs, or safety harnesses and lanyards, on external decks where there is a risk of falling or being carried overboard.

SECTION 3 - CONCLUSIONS

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

1. An appropriate risk assessment of *Zenith*'s operation had not been carried out. Such a risk assessment should have identified the hazards associated with standing on the bulwark to feed the net onto the net drum. [2.4]

2. Other than the skipper of *Zenith*, none of her crew had attended all the mandatory safety training as required, and crew members on board the owners' other vessels also lacked the necessary mandatory safety training. [2.6]

3. It was the responsibility of *Zenith*'s skippers and owners to ensure that their crew members had undergone training. That this was not done reflects poorly on their attitude to health and safety. [2.6]

4. Assistance with risk assessment previously offered by the MCA and Seafish, and currently by the SFF, has proven to be beneficial and should be extended to the industry as a whole. [2.7]

5. Onboard training and emergency drills, which could have identified and thereby helped mitigate the crew's and vessel's lack of preparedness to deal with a MOB recovery, were not carried out on board Zenith, nor were they observed by the MCA during its intermediate survey shortly after the accident. [2.8]

6. *Zenith*'s owners made inflatable lifejackets readily available, but crew members were not obliged to wear them. [2.9]

7. Until the wearing of PFDs becomes a legal requirement, the owners of Zenith should set their own standards and insist on the wearing of PFDs or safety harnesses on external decks where there is a risk of falling or being carried overboard. [2.9]

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

1. Significant modifications to *Zenith* were completed without the knowledge or approval of the MCA, as required by the Fishing Vessels (Safety Provisions) Rules 1975. [2.3]

2. The practice of crew standing on the bulwark top rail to feed the net onto the net drum was known about and condoned by the skipper. [2.4]

3. Manually pushing bridle wires and net wings apart on the net drum could have resulted in injury from being dragged into the revolving drum. [2.4]

4. Mr Nedoliz climbed on top of the bulwark rail to simplify a task that was unnecessary and, in any event, could have been carried out safely from the deck. [2.5]

5. Mr Nedoliz demonstrated a severe lack of self-preservation by standing on the top rail and ignoring his colleagues' warning shouts. [2.5]

6. Without wearing a PFD, Mr Nedoliz would have struggled to remain afloat, exacerbating the effects of cold shock response. [2.5]

7. Many fishermen in the Kilkeel area ignored the regulatory safety training requirements. [2.6]

SECTION 4 - ACTIONS TAKEN

4.1 ACTIONS TAKEN

Following the investigation of the loss of a crewman from the fishing vessel *St Amant*, 13 January 2012, published 9 January 2013, the **Marine Accident Investigation Branch** has:

Made recommendations (2013/104 and 2013/105), to the **Maritime and Coastguard Agency** to:

2013/104 *Introduce a policy and procedure for conducting inspections of fishing vessels following accidents that have resulted in a fatality, serious injury* [8] *or serious damage. The procedure should require examination of the factors that are relevant to the circumstances of the accident, including:*

- *Any relevant exemptions which were granted that predate current regulatory requirements.*
- *That the working practices relevant to the circumstances of the accident were adequate and were consistent with existing rules and obligations.*
- *The risk assessments relevant to the circumstances of the accident. In particular, the quantification of the hazard and risk, and the effective implementation of the specified control measures, including the use of personal protective equipment.*
- *The effectiveness of the crews' response to the accident or emergency, including effective preparation and use of equipment.*

2013/105 *Improve the management of fishing vessel surveys and inspections by ensuring that:*

- *Existing survey and inspection procedures and guidance are reviewed to improve the clarity of the guidance and ensure that it is consistent throughout.*
- *There is an effective and readily accessible system to record and provide information to surveyors on the status of all identified deficiencies.*
- *Existing instructions requiring a photographic record of a vessel's principal features are followed.*

[8] To be defined, but should include cases where a crewman has to be evacuated from sea for medical reasons, is admitted to hospital for more than 24 hours, or is unable to work for a significant period due to their injuries

The **owners of *Zenith*** have:

- Ensured that the crew members of all their vessels have completed all mandatory safety training.

- Amended their net hauling operations to ensure there is no need for crew members to stand on the bulwark rail.

- Constructed a hoop-like device attached to an extended pole to assist in retaining persons in the water alongside in the event of manoverboard accidents.

The **Anglo Northern Irish Fish Producers Organisation** has:

- Committed to provide its 48 member vessels with onboard safety audits which will include reviews of operating practices and risk assessment.

The **National Federation of Fishermen's Organisations** has:

- Applied to the European Fisheries Fund for assistance in acquiring PFDs. Consequently, it is to purchase 1000 units for distribution to its members at a nominal cost.

SECTION 5 - RECOMMENDATIONS

The **owners of *Zenith*** are recommended to:

2013/112 Promote best working practices and improve the overall safety of their crews by:

- Conducting emergency drills and training on board all their vessels as required by the 15-24 code.
- Ensuring suitable and sufficient risk assessments are conducted, recorded, shared with their crews and reviewed regularly.
- Verifying that all new crew members' mandatory safety training is appropriate and recorded accordingly.
- Insisting on the wearing of PFDs or safety harnesses when crew are working on external decks.

The **Sea Fish Industry Authority** is recommended to:

2013/113 Work with the Fishing Industry Safety Group (FISG) to identify how the type of assistance with risk assessment offered by the Scottish Fishermen's Federation and the Anglo Northern Irish Fish Producers' Organisation to their members can be provided across the industry.

The **Maritime and Coastguard Agency** is recommended to:

2013/114 Strengthen its survey and inspection regime to ensure that effective emergency drills and crew training certificates are observed during renewal and intermediate surveys, as required by its internal guidance to surveyors and MGN 430.

January 2013
Marine Accident Investigation Branch

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

Annex A

MSN 1731 (M+F), the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999

Maritime and Coastguard Agency

MERCHANT SHIPPING NOTICE

MSN 1731 (M+F)

The Merchant Shipping and Fishing Vessels Personal Protective Equipment Regulations 1999

This Merchant Shipping Notice is an integral part of the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999.

Notice to employers of crew, masters, safety officers and safety representatives.

This Notice supersedes Merchant Shipping Notices No. M1195 and M1358.

Summary

- This Notice gives notice of new regulations governing the provision of personal protective equipment, the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999. These Regulations supersede the Merchant Shipping (Protective Clothing and Equipment) Regulations 1985 (S.I. No. 1664), and come into force on 25 October 1999

- Annex 1 gives the design standards for personal protective equipment in use on board ships, for specified work activities and situations, in order to comply with regulation 5(2)(a) of the new Regulations.

Introduction

1. The Regulations require employers to ensure that personal protective equipment (PPE) is provided for their workers who are engaged in, or at risk from, a hazardous work activity on board a United Kingdom ship[1].

2. The Regulations are subject to the general rule that use of PPE is always a last resort, where risks cannot be avoided or reduced to a safe level by means of collective protection, or safe systems of work.

3. PPE must be provided free of charge to the workers, except that, where use of the equipment is not exclusive to the work place, workers may be required to contribute towards the cost.

[1] "worker" includes trainees and apprentices, but does not include persons who are training in a sail training vessel.

4. Where, traditionally, workers provide their own PPE, the employer remains responsible for ensuring that workers are equipped with appropriate PPE, and that they use it when engaged in work of the types outlined in Annex 1.

5. The equipment issued must be "suitable", which is defined as :

(a) in relation to any work process described in [this] Merchant Shipping Notice MSN 1731 (M+F), of the kind and to the standard specified [in that Merchant Shipping Notice], in relation to that work process;

(b) appropriate for the risks to which he worker is exposed and to the task which he is performing, without itself leading to any increased risk;

(c) correctly fitting the worker, or capable of being adjusted to fit;

(d) taking into account ergonomic requirements and the worker's state of health; and

(e) compatible with any other equipment the worker has to use at the same time, so that it continues to be effective against the risk"

6. In addition, the employer must ensure that the PPE supplied is easily accessible, and properly stored and maintained, and that where appropriate, instructions are available to the workers who are required to carry out any maintenance. The equipment must be regularly inspected, in accordance with the manufacturers instructions, and its operation checked. Respiratory protective equipment must be always be checked before and after use.

7. The employer must ensure, so far as is reasonably practicable, that PPE issued under the regulations is used as instructed - eg that workers do not use it for a purpose for which it is not designed, and that it is put on and worn correctly.

8. Workers must receive adequate and appropriate training so that they are aware of the risks against which the PPE is designed to protect them, and of when and how to use it and look after it correctly. This may include demonstrations of the wearing of PPE, where appropriate.

9. Workers are required to wear and use the PPE which has been issued to them when appropriate, and to comply with any training and instruction provided.

Standards of design and manufacture

10. The specifications for PPE are set out in the Annex. The list covers the PPE most commonly used on ships, but is not exclusive.

11. The letters "EN" stand for "European Norm". Where no "EN" standard is available, a BS standard is quoted. The letters "BS" refer to a British Standard. The standards are those to which the clothing and equipment should comply and the date which appears will be the date on which the latest revision of the relevant Standard was published, including all amendments at the date of this Merchant Shipping Notice.

12. Any reference to an EN or BS standard contained in the annex means that standard or an alternative Standard which provides, in use, equivalent levels of safety, suitability and fitness for purpose.

13. The standards of equipment given in this Merchant Shipping Notice do not apply to life saving appliances or other equipment which is subject to the Merchant Shipping (Marine Equipment) Regulations. (S.I. 1999/1957).

14. Publications mentioned in Annex 1 are available from:

"BS" and "EN" Specifications:

The British Standards Institution
389 Chiswick High Road
London
W4 4AL

The Code of Practice, **"Noise Levels in Ships"** is available from The Stationery Office.

MSPP3 (Seafarers Health and Safety)
The Maritime and Coastguard Agency
Bay 2/1
Spring Place
105 Commercial Road
Southampton
SO15 1EG

Tel: 01703 329390
Fax: 01703 329251

August 1999

[MC 122/6/053]

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An executive agency of the Department of the Environment, Transport and the Regions

ANNEX 1

STANDARDS OF PERSONAL PROTECTIVE EQUIPMENT

Note: all protective clothing should conform to EN 340 : 1993 - 'Protective clothing. General requirements.'

	Work activity	Protective clothing and equipment to be provided	Full title of Standard
1	Any process or activity involving a reasonably foreseeable risk to the head from falling or moving objects.	Head protection EN 397 : 1995	Specification for industrial safety helmets.
2.	When working in areas where the circumstances involve a reasonably foreseeable risk to the head from bruising or abrasion.	Scalp protection to EN 812 : 1997	Industrial bump caps.
3.	When entering or working in a space or working with machinery or equipment where the noise level exceeds 85dB(A).	Hearing protection complying with section 10 and appendix 3 of the Code of Practice for Noise Levels in Ships published by the Department of Transport (1990):	
		EN 352-1 : 1993	Ear muffs.
		EN 352- 2 : 1993	Ear plugs.
		EN 352- 3 : 1996	Ear muffs attached to an industrial safety helmet.
		EN 458 : 1994	Hearing protectors. Recommendations for selection, use, care and maintenance.
4.	Welding and gas cutting.	Eye and face protection to EN 175 : 1997	Personal protection. Equipment for eye and face protection during welding and allied processes.
		EN 166 : 1995	Personal eye protection. Specifications.
		EN 379 : 1994	Specification for filters with switchable or dual luminous transmittance for personal eye protectors used in welding and similar operations.
		EN 169 : 1992	Specification for filters for personal eye protection equipment used in welding and similar operations.

Work activity		Protective clothing and equipment to be provided	Full title of Standard
		Body protection to EN 470-1 : 1995 Additional protection may be required in some situations (eg for particularly intense welding/cutting operations)	Protective clothing for use in welding and allied processes. General requirements.
	Electric arc welding (in addition to above)	Safety footwear to BS 7193	Specification for lined lightweight rubber overshoes and overboots
5.	Any work activity in which there is a reasonably foreseeable risk of injury to the eye from particles, fragments or injurious substances.	Eye protection to EN 166	As above.
6.	Any work activity involving working in an atmosphere which is likely to be hazardous to health.	Note - The following items should be selected and maintained according to BS 4275 : 1997	Guide to implementing an effective respiratory protective device programme.
a)	Protection against nuisance dust mist, particles and dust of low toxicity.	Disposable dust respirators conforming to EN 149 : 1991	Specification for filtering half-masks to protect against particles.
		General purpose dust respirators conforming as appropriate to one of the following:	
		EN 136 : 1998	Respiratory protective devices: Full face masks.
		EN 140 : 1998	Respiratory protective devices: Half masks and quarter masks
		EN 141 : 1990	Respiratory protective equipment: Gas filters and combined.
		EN 143 : 1990	Specification for particle filters used in respiratory protective equipment.
		EN 371 : 1992	Specification for AX gas filters and combined filters against low boiling organic compounds used in respiratory protective equipment.
		EN 372 : 1992	Specification for SX gas filters and combined filters against specific named compounds used in respiratory protective equipment.
		EN 1827: 1999	Half masks without inhalation valves, with separate filters to protect against gases or gases and particles or particles only.

Work activity		Protective clothing and equipment to be provided	Full title of Standard
b)	Protection against toxic dusts and gases of low toxicity.	Respirators conforming as appropriate to one of the following:	
		BS 7355 (EN 136)	As above.
		BS 7356 (EN 140)	As above.
		EN 141	As above.
		EN 143	As above.
		EN 371	As above.
		EN 372	As above.
		EN 405 : 1992 Note: particulate filters may be incorporated for some applications.	Valved filtering half masks for gases or gases and particles.
		EN 1827: 1999	Half masks without inhalation valves, with separate filters to protect against gases or gases and particles or particles only.
c)	Protection against toxic dust.	Powered dust respirators, powered dust hoods and blouses conforming as appropriate to one of the following:	
		EN 136	As above (note: this only applies to the mask).
		EN 143	As above.
		EN 12942: 1998	Specification for power assisted particle filtering devices incorporating full face masks, half masks or quarter masks.
		EN 12941: 1998	Respiratory protective devices. Specification for powered particle filtering devices incorporating helmets or hoods.
d)	Protection against highly toxic atmospheres; or where there is oxygen deficiency; or as an alternative to the items above, where suitable.	Breathing apparatus conforming to: EN 1146 : 1997 (for self-rescue only) "Escape sets"	Respiratory protective devices for self rescue. Self contained open-circuit compressed air breathing apparatus incorporating a hood (compressed air apparatus with hood). Requirements, testing, marking.

Work activity		Protective clothing and equipment to be provided	Full title of Standard
		EN 137 : 1993	Specification for respiratory protective devices: self contained open-circuit compressed air breathing apparatus.
		EN 138 : 1994	Respiratory protective devices. Fresh air hose breathing apparatus for use with full face mask, half mask or mouthpiece assembly.
		EN 139 : 1994	Respiratory protective devices. Compressed air line breathing apparatus for use with a full face mask, half mask or mouthpiece assembly. Requirements, testing, marking.
		EN 269 : 1994	Respiratory protective devices. Powered fresh air hose breathing apparatus incorporating a hood.
		EN 270 : 1994	Respiratory protective devices. Compressed air line breathing apparatus incorporating a hood. Requirements, testing, marking.
		EN 271 : 1995	Respiratory protective devices: Compressed air line or powered fresh air hose breathing apparatus incorporating a hood for use in abrasive blasting operations.
		EN 402 : 1993	Respiratory protective devices for escape. Self contained open-circuit compressed air breathing apparatus with full face mask or mouthpiece assembly.
7.	Any process or activity involving working in an area where there is a reasonably foreseeable risk of injury from substances which are corrosive or likely to be absorbed through the skin.	Protective overalls, gloves or head gear, whichever is appropriate:	
		EN 340 : 1993	Protective clothing: General requirements.
		EN 465 : 1995	Protective clothing. Protection against liquid chemicals. Performance requirements for chemical protective clothing with spray-tight connections between different parts of the clothing (Type 4 equivalent).

Work activity		Protective clothing and equipment to be provided	Full title of Standard
		EN 466 : 1995	Protective clothing. Protection against liquid chemicals. Performance requirements for chemical protective clothing with liquid-tight connections between different parts of the clothing (Type 3 equivalent).
		EN 467 : 1995	Protective clothing. Protection against liquid chemicals. Performance requirements for garments providing protection to parts of the body.
8.	Any process or activity involving a reasonably foreseeable risk of injury to the hands unless the use of hand protection would increase the risk.	Hand protection conforming as appropriate to :	
		EN 374	Protective gloves against chemicals and micro-organisms.
		EN 374-1 : 1994	Terminology and performance requirements.
		EN 374- 2 : 1994	Determination of resistance to penetration.
		EN 374- 3 : 1994	Determination of resistance to permeation by chemicals.
		EN 388 : 1994	Protective gloves against mechanical risks.
		EN 407 : 1994	Protective gloves against thermal risks
		EN 420 : 1994	General requirements for gloves.
		EN 511 : 1994	Protective gloves against cold.
9.	Any process or activity involving particular risk of injury to the feet.	Foot protection conforming to : EN 345 ; or	Safety footwear for professional use.
		EN 346, whichever is appropriate:	Protective footwear for professional use.
		EN 345- 1 : 1992	Specification.
		EN 345- 2 : 1996	Additional specifications.
		EN 346- 1 : 1992	Specification.
		EN 346-2 : 1996	Additional specifications.
		EN 347-1 : 1992	Occupational footwear for professional use.
		EN 347-2 : 1996	Additional specifications.

Work activity		Protective clothing and equipment to be provided	Full title of Standard
10.	Work aloft or in any other area where there is a reasonably foreseeable risk of falling a distance of more than 2 metres.	Safety belt or harness and associated lanyard conforming to the following:	
		EN 353-1 : 1992	Specification for guided type fall arresters on a rigid anchorage line.
		EN 353- 2 : 1992	Specification for guided type fall arresters on a flexible anchorage line.
		EN 354 : 1992	Personal protective equipment against falls from a height. Lanyards.
		EN 355 : 1992	Personal protective equipment against falls from a height. Energy absorbers.
		EN 360 : 1992	Personal protective equipment against falls from a height. Retractable fall arrangements.
		EN 361 : 1992	Personal protective equipment against falls from a height. Full body harnesses.
		EN 362 : 1992	Personal protective equipment against falls from a height. Connectors.
		EN 363 : 1992	Personal protective equipment against falls from a height. Fall arrest systems.
		- or where the use of portable ladders is necessary, such ladders to be used in accordance with Chapter 15 of the Code of Safe Working Practices for Merchant Seamen.	
11.	Any work carried out from an overside position or in an exposed position where there is reasonably foreseeable risk of falling or being washed overboard or any work carried out in or from a ship's boat.	A lifebuoy with sufficient line attached ready for immediate use and either a Maritime and Coastguard Agency approved lifejacket or a lifejacket conforming as appropriate to one of the following, taking into account the area of operation:	
		EN 394 : 1994	Life jackets and personal buoyancy aids. Additional items.
		EN 396 : 1993	Life jackets and personal buoyancy aids. Life jacket 150.

Work activity		Protective clothing and equipment to be provided	Full title of Standard
		EN 399 : 1993 Partially inherent lifejackets must have at least 89 N of inherent buoyancy; and with the inflatable sections relying on automatic inflation.	Life jackets and personal buoyancy aids. Life jacket 275.
12.	Any work activity where it is necessary to carry out repair or maintenance work on or near exposed live electrical equipment and there is a reasonably foreseeable risk of injury.	Rubber gloves conforming to: BS 697 : 1986 EN 60903 : 1992 Protective sleeves conforming to EN 60984 : 1993 An insulating mat (except where specially insulated flooring is installed) conforming to BS 921 : 1976 Rubber soled footwear (no standard necessary). Note - gloves, sleeves and mats should protect against the appropriate voltage.	 Specification for rubber gloves for electrical purposes *[4 classes of gloves rated at 650v and above]* Gloves and mitts of insulating material for live working. Sleeves of insulating material for live working. Specification. Rubber mats for electrical purposes.
13.	Any work activity involving a reasonably foreseeable risk of injury from vehicle movement eg during ro-ro operations.	Suitable high-visibility garment conforming to EN 471 : 1994	Specification for high-visibility warning clothing.
14.	Any work process involving exposure to heat	EN 531 : 1995	Protective clothing for industrial workers exposed to heat (excluding fire-fighters' and welders' clothing).
15.	Work in engine rooms or any area where there is a risk of fire.	Overalls made of fabric of low flammability - eg - natural fibre, high cotton content; - non-flammable clothing as appropriate	 Cotton or cotton and polyester clothing with flame-retardant finishes are available to protect against sparks and flame.

Annex B

MGN 311 (F), Working and Protective Gear for Fishermen

Maritime and Coastguard Agency

MARINE GUIDANCE NOTE

MGN 311 (F)

WORKING AND PROTECTIVE GEAR FOR FISHERMEN

Notice to all Designers, Builders, Owners, Employers, Skippers and Crew Members of Fishing Vessels

This notice should be read in conjunction with MSN1731 (M+F) for details of technical standards and MGN 20 (M+F) and supersedes MGN 237(F).

Summary

This Note provides general advice on the supply and use of working gear and protective gear (personal protective equipment (PPE)) on board fishing vessels. It includes advice on the application to fishing vessels on the principal requirements of the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999.

- Protective gear (or PPE) should only be used where acceptable levels of risk cannot be eliminated. Elimination of hazards identified by risk assessment is a primary objective.
- Advice is provided to help decide when and which protective gear (or PPE) can be used for dealing with risks that commonly occur on board.
- Annexes 1 and 2 provide examples of protective gear checklists that can be kept readily available for the information of crewmembers.
- This note may be used to meet requirements for information and training as required by articles 7, 8, 9 and 10 of European Council Directive 93/103/EC.

1 Introduction

1.1 This Note provides general advice on the supply and use of working gear and protective gear (personal protective equipment (PPE)) on board fishing vessels. It includes advice on the application to fishing vessels on the principal requirements of the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999.

2 What the owner should do to assess the need for protective gear

2.1 There are four stages that the owner should go through to assess the need for protective gear, as follows:

A – As part of an overall risk assessment consider the use of working gear and protective gear. Use this to identify those risks that can only be addressed by the use of such equipment.

B – Decide on what the gear must be capable of to address the risks identified (in A). Make sure you take into account any problems that a particular type or design of gear may create.

C – Compare to ensure that the gear considered in B addresses the risks identified in A. Consult with crewmembers to make the final choice of design and type of gear and to ensure that the gear is effective.

D – Inform all crewmembers of the working gear and protective gear that should be available and worn under those circumstances identified (in A). Checklists similar to those in the Annexes to this MGN may be applied.

N.B. Protective gear should always be looked on as a safety measure of last resort. It should only be used when you cannot remove the safety risk completely or reduce it to a safe level by more effective means. e.g. It is better if work can be performed under a protective shelter than to address the risk of crew working on deck. The main aim should always be to remove or contain the source of harm so that everyone is protected, not just those wearing protective gear.

3 Categories of Protective Gear

3.1 What fishermen wear for their own protection can be split into three groups:

- Working Gear
- Protective Gear
- Specialist Protective Gear

paragraphs 3.2 to 3.4 provide guidelines on what can be considered as meeting these 3 groups.

3.2 Working Gear

This includes those items of personal clothing that, by reason of practicality, share fishermen usually supply for their own use, inclusive of oilskins, overalls and working boots. They can have important features giving protection from slips and falls, wet and cold, additional buoyancy, compatibility with other protective equipment (such as constant wear lifejackets) and aids to being seen and colour contrast with the marine environment.

3.3 Protective Gear

This includes additional items that the employer or owner supplies (such as eye protection and buoyancy equipment), after having identified the need through risk assessment.

3.4 Specialist Protective Gear

This is specialist equipment requiring formal training and greater familiarity before it can be used safely. This includes such items as oxygen meters and breathing apparatus used for entry into enclosed spaces. Without such equipment and proper training such risks are to be avoided. Delay tasks requiring specialist equipment until they can be carried out safely by specialist contractors when in port.

4 Summary for Supply, Use and Maintenance of Working and Protective Gear

4.1 When supplying, using or maintaining working and protective gear, it is important that the following is taken into account:

- The choice of working and protective gear should be based on the findings of a risk assessment. Refer to MGN 20 (M+F) for details;
- Outer clothing or clothing worn over clothing should be in bright colours, contrasting with the marine environment and clearly visible;Information on what working gear and protective gear is needed should be available to all on board, (such as in the examples shown in the Annexes);
- Gear should comply with relevant standards of design and manufacture (e.g. new equipment should carry the British Standard or European Norm (CE) marking appropriate for the intended use. See MSN 1731(M+F) for detailed technical standards);
- Gear should be appropriate to the risks identified, the working environment and should fit, or be adjustable to fit, the individual wearing it;
- Gear should be stored, inspected, maintained and repaired so that it remains effective, and should be accessible;
- Instructions for use should always be available, and workers instructed or trained in the proper use of the equipment;
- The skipper and the owner should ensure that the proper working gear and protective gear is used when the risks demand it;
- Where gear is not supplied for an individual's sole use, it must be kept in a hygienic condition so that it can be shared safely;
- Fishermen should wear and use the working gear and protective gear when appropriate and comply with any training and instruction provided.

5 Regulations

5.1 MSN 1731 (M+F) outlines the requirements of the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999. It also contains an expanded list of work activities and relevant design standards of protective equipment. The regulations require employers to ensure that personal protective equipment (PPE) is provided for workers who are engaged in, or at risk from, a hazardous working activity on board United Kingdom fishing vessels.

Further Information

Further information on the contents of this Notice can be obtained from:

Fishing Vessel Safety Branch
Bay 2/05
Maritime and Coastguard Agency
Spring Place
105 Commercial Road
Southampton
SO15 1EG

Tel : +44 (0) 23 8032 9163
Fax : +44 (0) 23 8032 9447
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infoline@mcga.gov.uk
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MCA Website Address: www.mcga.gov.uk

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Annex 1- For Crew of Smaller Fishing Vessels (Under 24 metres Registered Length)
A Guide to Personal Working Gear and Protective Gear for Fishermen – Basic Checklist to Protect Against Injury *

		WORKING GEAR				PROTECTIVE GEAR							SPECIALIST PROTECTION	
ACTIVITY	LOCATION	Oilskins *(and partial)*	Boiler Suit	Work Boots	Gloves	Hard Hat	Ear Protection	Safety line/ Harness	Lifejacket/ Buoyancy Equipment	Safety Goggles	Rubber gloves/ Apron	Insulated Jacket & trousers	Breathing Apparatus	Oxygen Meter
Fishing Watch	Working deck	●	●	■	●	■			■					
Any	Engine Room		■	■	●	●	■							
Any	Aloft	●	●	■	■	■		●						
Any	Outboard	●		■	■	●		●	■					
Grinding & cutting	Engine Room		■	■	■	●	●			■				
Grinding & cutting	Working deck		■	■	■	●				■				
Exposed work Including Shooting and hauling	Working deck	■		■	■	■		●	■					
Mooring	Working deck			■	■	■			■					
Stowage/ handling	Fish Room			■	■									
Stowage	Refrigerated Fish Room			■	■	●						■		
Battery maintenance	Engine Room		■	■			●			■	■			
Battery maintenance	Wheelhouse		■	■		●				■	■			
Loading/un-loading Fish Boxes & lifting Gear	Working deck			■	■	■								
Any	Enclosed space			■									■	■
Vessel maintenance	Inside Outside			■ ■	■ ■	■			● ●	● ●				

* You may find this checklist helpful in considering what you need to do to protect against injury in hazardous situations. It may also help you to comply with regulations. MSN 1731 (M+ F) identifies a fuller range of work activities, the PPE required and sets out the standards required for those items of protective clothing.

■ means a high priority item/essential

● means a priority dependant upon the local circumstances and the location

Annex 2 – For Crew of Larger Fishing Vessels (24 metres Registered Length and Over)
A Guide to Personal Working Gear and Protective Gear for Fishermen – Basic Checklist to Protect Against Injury *

		WORKING GEAR				PROTECTIVE GEAR							SPECIALIST PROTECTION	
ACTIVITY	LOCATION	Oilskins *(and partial)*	Boiler Suit	Work Boots	Gloves	Hard Hat	Ear Protection	Safety line/ Harness	Lifejacket/ Buoyancy Equipment	Safety Goggles	Rubber gloves/ Apron	Insulated Jacket & trousers	Breathing Apparatus	Oxygen Meter
Fishing Watch	Working deck	●	●	■	●	■			●					
Any	Engine Room		■	■	■	†	■							
Any	Aloft	●		■	■	■		●						
Any	Outboard	●		■	■	■		●	●					
Grinding & cutting	Engine Room		■	■	■	†	■			■				
Grinding & cutting	Working deck			■	■	■	●			■				
Exposed work Including Shooting and hauling	Working deck	●		■	■	■			●					
Mooring	Working deck		●	■	■	■								
Stowage/ handling	Fish Room			■	■									
Stowage	Refrigerated Fish Room	●		■	■							■		
Battery maintenance	Engine Room		■	■		†	■			■	■			
Battery maintenance	Wheelhouse		●	■		●				■	■			
Loading/un-loading Fish Boxes & lifting Gear	Working deck	●	●	■	■	■								
Any	Enclosed space		●	■	●	●				●			■	■
Vessel maintenance	Inside Outside			■ ■	■ ■	■				● ●				

* You may find this checklist helpful in considering what you need to do to protect against injury in hazardous situations. It may also help you to comply with regulations. MSN 1731 (M+ F) identifies a fuller range of work activities, the PPE required and sets out the standards required for those items of protective clothing.

■ means a high priority item/essential
● means a priority dependant upon the local circumstances and the location
† means, "or a bump cap" as a high priority /essential

Annex C

Professor Mike Tipton's comments on a fatal MOB from FV *Maggie Ann*

COMMENTS ON THE FATALITY THAT OCCURRED ON THE FV MAGGIE ANN, 12/02/09

Professor Mike Tipton M.Sc., Ph.D

[redacted]

Background

The details of this incident are presented as received from the MAIB at Annex A. The question I have been asked to address is: "Would a lifejacket have helped prevent the fatality?"

Comment

This immersion death occurred in approximately 8 minutes. This fact alone rules out hypothermia as a cause of death. The short survival time probably also removes the possibility of death being due to incapacitation caused by the cooling of superficial nerves and muscles. Death is most likely therefore due to some component of the "Cold Shock" response (CSR) – the cardio-respiratory responses initiated by rapid cooling of the skin on initial immersion that can act as precursors to drowning or cardiac problems. The water was cold enough to produce a CSR and the clothing worn by the deceased will have done little to attenuate this response. Although the head of the deceased was above the water, witnesses report that "sometimes waves were covering his face" and his "head was bobbing in the wake"

Although the deceased was thrown lifebuoys and urged to get hold of them, it appears that he was not able to do this.

Possible causes of death are therefore:

a. Drowning – I have no specific data (e.g. post mortem) to support drowning as the cause of death, although the description of the deceased as having a dark red/blue face could have resulted from right heart failure as a consequence of water in the lung. Assuming that the use of the phrase "suddenly disappeared" by an eye witness means "sunk below the surface" rather than drifting out of sight, this may also indicate flooding of the lungs and a consequent loss of buoyancy. Sudden disappearance due to sinking would also suggest that a large part of any air trapped in the deceased clothing took about 8 minutes to escape.
b. Cardiac arrest – I have no specific data (e.g. post mortem or medical information from his own medical records) to support cardiac problems as the cause of death. However, given that the deceased was relatively young and a non-smoker it is unlikely that he had pathological problems with his heart (myocardial ischaemia). The evidence seems more supportive of a pathophysiological cardiac problem as a consequence of immersion in cold

water with periodic face immersion; this has been reported to produce cardiac arrhythmias (Tipton et al, 1994).

To some extent, with regard to addressing the question of the potential value of a lifejacket, the cause of death is somewhat academic as in both cases a lifejacket would have helped. A lifejacket with a light, splash guard, webbing and a crotch strap fulfils several functions, these include:

a. Buoyancy: provided a lifejacket is correctly fitted it should help keep the airway and face clear of the water.
b. Decreased cooling: due to insulation provided by the jacket (small effect) and the reduced requirement for exercise and fewer periods of head immersion (larger effect) in the water that accelerate core cooling.
c. Decreased cardiac workload: due to reduced requirement to exercise to stay afloat.
d. Increased visibility: colour of the lifejacket and the light.
e. Greater ease of rescue: due to hand holds provided by a lifejacket.
f. Improved chance of body recovery: due to the buoyancy provided by a lifejacket helping the body remain at the surface of the sea if the lungs flood and the body becomes negatively buoyant.

Conclusion

The survivability of the crewman on the FV Maggie Ann would have been significantly improved had he been wearing a lifejacket.

Reference

Golden F. & Tipton M. (2002) Essentials of Sea Survival. Human Kinetic, Il, USA.

Tipton M, Kelleher, P & Golden F (1994) Supraventricular arrhythmias following breath-hold submersions in cold water. Undersea & Hyperbaric Medicine 21(3): 305-13.

ANNEX A

FV Maggie Ann

Narrative

Maggie Ann was engaged in scallop dredging. The vessel was in the process of lifting her dredges from the sea on to her deck at about 1300. As the deceased leaned over to empty the contents of the dredges, the lifting becket on the dredge parted and he lost his balance and fell into the sea at approximately 1308. He was not wearing a lifejacket.

The incident was witnessed by another deck hand who raised the alarm and threw a lifebuoy into the sea. The skipper reacted by putting the engines astern. As the vessel went astern, a second lifebuoy was thrown into the sea and the crew members urged the deceased to grab on to the lifebuoy.

The vessel and lifebuoy were probably a few metres away from the deceased when he disappeared from the surface at approximately 1316. Despite an extensive search and rescue operation which lasted over more than two hours, he was not found.

Weather/Environmental conditions

Location: Cardigan Bay, Wales

- Wind SW 3-4
- Sea <0.5M (said to be 1 foot), choppy at the time the deceased fell in water as the wind had picked up.

Weather data captured from a nearby weather monitoring buoy:

- Wind direction SSW/ Speed 13 knots
- Wave height 3 feet
- Wave period 6 seconds
- Air temp 42.3 F (6.0º C)
- Sea temp 43.9 F (6.5º C)
- Wind chill 34.7F (1.5º C)
- Civil twilight 1805

Details on Deceased

Romanian national
DOB: 30.12.1970 Age 38 Years, and said to be of good health – non smoker
(Copy of seaman's book attached)

Reported to be wearing trousers, sweat shirt (or a shirt and sweater), wellingtons and oil skin on top.
Discarded wellingtons in the water.
Experienced fisherman but had been working onboard for only a month when the accident happened.

Description of deceased in water by witnesses

- Describe him to be conscious-as he was trying to stay afloat
- When he fell, he initially was facing away from the boat
- His head was above the water
- Sometimes the waves were covering his face
- Head bobbing in the wake
- Looked towards them with eyes wide open- could see the white of his eyes
- Colour of face described as dark red/blue
- Did not communicate back to them despite constant urging to hang on
- Only one witness describes the deceased of placing his hand over his ears before he disappeared from the surface.
- It was as if he suddenly lost his strength to grab the lifebuoy
- He turned, face down in the water, he suddenly disappeared.

Marine Accident Report