

Report on the investigation of

a fatal accident on board

mfv Dunan Star (CY 26)

1.5 miles south-west of the Isle of Arran

on 10 August 2000

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

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GLOSSARY OF ABBREVIATIONS

CWBE	Constant Wear Buoyancy Equipment
GRP	Glass Reinforced Plastic
kW	kilowatt
m	metre
MAIB	Marine Accident Investigation Branch
MGN	Marine Guidance Note
mm	millimetre
MOB	Man overboard
SFIA	Sea Fish Industry Authority
UK	United Kingdom
UTC	Universal Co-ordinated Time



Location of accident

Reproduced from Admiralty Chart 4014 by permission of the Controller of HMSO and the UK Hydrographic Office

SYNOPSIS

On 10 August 2000, the Marine Accident Investigation Branch (MAIB) was notified of a fatality on board the 11.19m potting vessel *Dunan Star* that day.

While shooting for dog whelks 1½ miles south-west of the Isle of Arran, a crew member became entangled in the back rope of a fleet of pots and was dragged overboard.

The weight of the fishing gear dragged him under the water. Although the skipper pulled the victim back to the surface using the pot hauler, he was unable to reach the part of the rope that was caught around his leg. However, after cutting a section of rope he could reach, the skipper was left with the inboard end of rope and the crewman was again dragged under.

The rescue services were scrambled to the scene and the victim's body was recovered 30 minutes later. It was still entangled in the fishing gear.

The crewmember had been involved in a similar accident just two days before this one.

Contributory causes of the accident were:

- The lack of a safety measure to prevent the crew from coming into contact with the back rope during shooting operations.
- The casualty's inexperience.
- The skipper's failure to recognise that the previous accident had shown the shooting operation to be unsafe, and so adopt an alternative procedure.
- The lack of a risk assessment, which should have identified the risks involved so that the appropriate control measures could be taken.

The investigation has resulted in two recommendations to *Dunan Star*'s skipper/owners:

- To adopt an alternative deck system, such as a detachable pot/toggle system, which would prevent the crew coming into contact with the back rope during shooting operations.
- To provide the crew with working type lifejackets when working on deck on board their vessels.

PARTICULARS OF *DUNAN STAR* AND ACCIDENT

Vessel details (Figure 1)

Name	:	<i>Dunan Star</i>
Registered Owners	:	John and Matthew MacMillan 13, Woodside Crescent, Carradale by Campbeltown
Port of registry	:	Castlebay
Fishing Number	:	CY 26
Type	:	Potter
Built	:	Orkney Isles 1979
Construction	:	GRP
Gross tonnage	:	12.48
Length overall	:	11.19m
Length registered	:	10.15m
Breadth	:	3.87m
Depth	:	1.71m
Propulsion	:	Gardner diesel (66kW) single screw shaft

Accident details

Date and time	:	10 August 2000 1413 (UTC)
Location of incident	:	55° 28.9' N 005° 21.4 W
Injuries	:	1 fatality
Damage	:	None



Figure 1 - *Dunan Star*



SECTION 1 - FACTUAL INFORMATION

1.1 DESCRIPTION OF VESSEL

The potting vessel *Dunan Star* was built in the Orkney Isles during 1979. The vessel was constructed of GRP, and incorporated one main deck above the waterline.

The design incorporated a forward wheelhouse/whaleback, with the working deck aft. A platform for stowing boxes and fishing gear was attached to the stern of the vessel.

Gunwale rails, approximately 1.80m in height, enclosed the platform aft and halfway down the port and starboard sides of the working deck. A space on both the port and starboard sides between the gunwale rails and wheelhouse was left for hauling and shooting the fishing gear.

The bulwarks surrounding the main deck were approximately 700mm high.

An additional helm position was situated on deck on the starboard side of the wheelhouse, close to the hydraulic pot hauler and its controls.

1.2 BACKGROUND TO THE VOYAGE

Dunan Star was purchased by her current owners, the skipper and his father, in April 2000.

The vessel was operated daily from Campbeltown, usually with a crew of three. During hauling and shooting operations the skipper was in the wheelhouse and the other two crewmembers were on deck.

However, on occasions it was necessary to operate the vessel with two crew, the skipper and one other. This normally happened when one of the crew did not turn up for sailing or was on holiday. On the day of the accident only the skipper and one deckhand were aboard.

1.3 THE CREW

Under *The Fishing Vessel (Certification of Deck officers and Engineer Officers) Regulations 1984*, the vessel was not required to have any certificated people on board, because of her size and operating area.

The skipper was an experienced fisherman, having been employed in the industry since 1982. He had undergone training in basic sea survival, first-aid and fire-fighting.

The other crewman, the deceased, was a relatively inexperienced fisherman, having joined the vessel just two weeks before the accident. His limited experience was gained on another vessel, which also operated from Campbeltown.

1.4 TYPE OF FISHING

Dunan Star was engaged in potting for dog whelks, more commonly known as buckies, using static holding pots (traps) which are baited and shot in a fleet or string of several pots on the fishing grounds.

Each pot is attached to a main back line by means of a leg rope. Anchors or weights are then attached to both ends of the back line to keep the pots in position on the seabed.

To identify the position of the pots, a dhan buoy on the sea surface is attached to both anchors in the fleet by means of a dhan rope.

Normally the pots are baited and shot from the vessel during one day and hauled back on another day. The catch is removed and the pots are then re-baited and shot again.

1.5 THE HAULING OPERATION

During the hauling operation all the crew are on deck. The skipper operates the pot hauler, and controls the vessel from the additional helm position. The other crew members are strategically positioned on deck to handle, bait and stack the pots ready for shooting again.

Once the dhan buoy identifying the fleet of pots is retrieved, the dhan rope and the anchor are heaved on board using the hauler.

The back rope is then taken around the hauler and lifting of the pots begins. As the rope is heaved on board, it piles up next to the hauler.

As each pot is hauled on board, the catch is removed. The pots are then re-baited and stacked in rotation at the aft end of the deck. Each pot is still connected to the back rope with a leg rope. The leg rope is pushed close into the base of the stacked pots to prevent the ropes from becoming tangled.

Often the leg rope is not long enough to reach the stack, so a bight of back rope is pulled from the pile to enable the pot to be stacked correctly.

By the time all the pots in the fleet have been hauled, the back rope has accumulated in a large pile next to the hauler. Preparations are then made for shooting.

1.6 THE SHOOTING OPERATION

For the shooting operation the skipper moves from the hauler to the wheelhouse. The dhan buoy and rope are paid out. Once the vessel has been manoeuvred into the

desired position, the dhan buoy is released and the anchor or weight, with the start of the back rope attached, is dropped overboard.

A shooting bar (a vertical steel pole set into the gunwale or similar arrangement) guides the back rope over the vessel's bulwark as the rope is pulled from the pile across the deck by the forward motion of the vessel.

The pots are taken from the stack in reverse order. A crewman lifts the pot from the stack and passes it over to another crewman positioned at the shooting bar. The pot is then lifted on to the gunwale and held until it is pulled overboard. One man has to complete both tasks if the crew is reduced to two men, and the skipper is in the wheelhouse during the shooting operation. It then requires the crewman on deck to move about, increasing the risk of being snagged in the back rope.

The crewman holds the pot on the gunwale, and the back rope crosses the deck near his feet. As each pot goes overboard, the next pot in sequence is placed on the gunwale ready for shooting. Meanwhile the back rope is still being pulled overboard, and often whips across the deck in bights. The crewman must take particular care at the shooting position to ensure that he is not caught by one of these bights.

When the last pot has gone overboard, the anchor and dhan buoy are thrown overboard to mark the other end of the fleet.

1.7 ENVIRONMENTAL CONDITIONS

The weather at the time of the accident was a north-westerly wind of force 3, with a slight sea and 0.5m north-westerly swell. The visibility was good.

1.8 NARRATIVE OF EVENTS (ALL TIMES ARE UTC)

Dunan Star sailed from Campbeltown harbour at approximately 0600 on 10 August 2000, bound for the fishing grounds off Johnstone Point, mid-way between Sanda Island and Campbeltown. The skipper and one deckhand were on board.

After arriving at the grounds, two fleets of pots were hauled and kept on board.

At approximately 0745, *Dunan Star* steamed to the grounds at Pladda, off the south-east corner of Arran. There, the two fleets of pots that had been hauled previously were shot again.

The vessel then steamed to the grounds at Blackwaterfoot, hauled two fleets of pots and then re-shot them, without incident.

After hauling, re-baiting and stacking the third fleet of pots, preparations were made for shooting. The skipper, who remained on deck, set *Dunan Star* on a course for shooting using the additional controls on the starboard side of the deck forward.

After the dhan was shot he went aft, and began taking pots from the stack and passing them to the deckhand, who was positioned a couple of feet from the starboard side gunwale. He in turn then began shooting them over the side.

After approximately 53 pots had been shot, leaving 6 or 7 on deck, the skipper went to pick up the next pot in rotation, when he heard the deckhand scream. He turned round and saw a bight of back rope around the deckhand's leg. He was hanging on to the starboard rail in an attempt to prevent himself being dragged over the side by the way on the vessel, and the weight of the pots that had already been shot.

The skipper immediately rushed forward to the dual controls on the starboard side and put the engines full astern in an effort to release the weight on the back rope. He also grabbed a knife, which was to hand. However, by this time the deckhand had been pulled over the side and was nowhere to be seen.

The skipper then grabbed the next pot in rotation, jammed it under the gunwale and cut the pot from the back rope, creating more slack. This enabled him to get the back rope into the hauler and to start heaving.

When approximately 12m of back rope had been heaved the deckhand came to the surface. He was still conscious and was hanging on to the rope. The skipper heaved the rope in until the deckhand's fingers were almost touching the roller on the hauler. The bight was still around his leg, and his feet were in the water. The skipper then leant over the side to try and cut the rope around the deckhand's leg, but he could not reach the weighted section of rope which was still attached to the fleet of pots.

He did manage to cut away a pot that was roped against the deckhand's leg. However, the skipper was unsure whether or not this had the effect of putting more pressure on the rope around the deckhand's leg. The deckhand then let go of the back rope and again disappeared under the water.

Again the skipper heaved on the hauler until the deckhand reappeared on the sea surface. At this time the skipper was unsure whether or not the deckhand was conscious, but he was now being pulled away from the boat at a 90° angle by the effect of the wind and tide. He also had some of the back rope around his chest and arms. The skipper, who could still not reach the bight round the deckhand's leg, cut some of the rope around his chest in an effort to relieve some of the strain on his upper body.

However, after cutting it the skipper was left with the part of the rope that led to the hauler, and the deckhand was dragged under the water by the weight of the pots on the other part. This was the last time the skipper saw him.

The skipper hurried to the wheelhouse, activated the MOB facility on the plotter, and called the coastguard on VHF radio and mobile phone. He informed them of the emergency and gave details of the incident and *Dunan Star's* position.

At 1413 Clyde Coastguard scrambled rescue helicopter R177, and tasked Campbeltown and Arran lifeboats to the scene. *Dunan Star's* skipper began patrolling the immediate area for any sign of the deckhand.



Figure 2 - Pot hauler and control position



Figure 3 - Working deck

Shortly after, Campbeltown lifeboat arrived on the scene. Two of the lifeboat crew transferred to *Dunan Star* and, along with the skipper, began hauling the fleet of pots.

After approximately 15 minutes, the time it took to haul the pots on board, the deckhand's body was recovered, still entangled in the fleet of pots.

The deckhand's body was transferred to the lifeboat and then to Campbeltown harbour, where, on arrival at 1600, he was pronounced dead by a doctor who had been called.

Dunan Star arrived in Campbeltown shortly after.

1.9 PREVIOUS INCIDENT

On 8 August 2000, two days before the fatal accident, *Dunan Star* was engaged in fishing. On board were the skipper, the casualty and another deckhand.

The crew were shooting the gear, with the skipper in the wheelhouse and both the casualty and the other deckhand on deck. The casualty was shooting pots over the side.

After a number of pots had been shot the skipper heard a warning shout from the deck. He immediately put the vessel into astern propulsion, grabbed a knife and ran out on to the deck, where he discovered the casualty had a bight of back rope around his leg.

On that occasion the skipper managed to cut the rope free and prevent the deceased from going over the side. He suffered minor injuries to his leg.

1.10 SAFE FISHING (POTTING AND CREELING)

Potting and Creeling, a leaflet produced by the Fishing Vessel Safety Trends Initiative Steering Group as part of a *Safe Fishing* campaign, contains the following safety advice:

Getting it right

- *Make sure the equipment is set up to ensure smooth and safe operation and keep all unnecessary gear away from the shooting and hauling areas.*
- *Try to separate the back rope from the working area (eg By fitting pound boards).*
- *Keep clear of the person who is shooting the pots and stay foreside of all pots and ropes.*

Getting it wrong

- *Stepping in a bight of wire or rope.*
- *Allowing concentration to lapse during shooting and hauling operations.*

1.11 SEA FISH INDUSTRY AUTHORITY

In May 1999, the Sea Fish Industry Authority (SFIA) produced a report entitled *Potting. Safety Assessment (Seafish Report No SR524)*.

The report was the conclusion of an investigation into the safety of pot fishing. As part of the investigation, field trips were undertaken on four potting vessels, varying in vessel size and layout of the working deck. Various hazards in pot fishing were identified during the hauling and shooting operation.

During the shooting operation, the main hazard identified was being caught up in a bight of back rope; a bight of rope caught round a limb during shooting will result in serious injury or death. The limb is likely to be severed, or the person will be dragged overboard and, even if wearing a lifejacket, pulled down by the weight of the pots.

Two hazard reduction methods were suggested:

1. *Detachable pot/toggle system*

The key to this system is a toggle clip which connects into a loop to join together the two-piece leg rope at a point quite close to the pot. During hauling, each pot is detached from the back rope, allowing the pot to be stored independently of the rope.

The loops on the leg rope are placed, in order, over a vertical pole. When the pots are shot, the toggle is connected back to the loop, and the pot is allowed to go over the side of the vessel.

Apart from the ability to stack the pots out of sequence, the system gives more compact storage of the back rope, allowing a division to be constructed, separating the rope from the deck area where the crew handle the pots (**Figure 4**).

2. *Rope pounds or divisions*

A method of separating the back rope and leg ropes from the crew is by using pound boards or divisions. The design of the barrier will depend on the layout of the vessel, and the stacking of the pots.

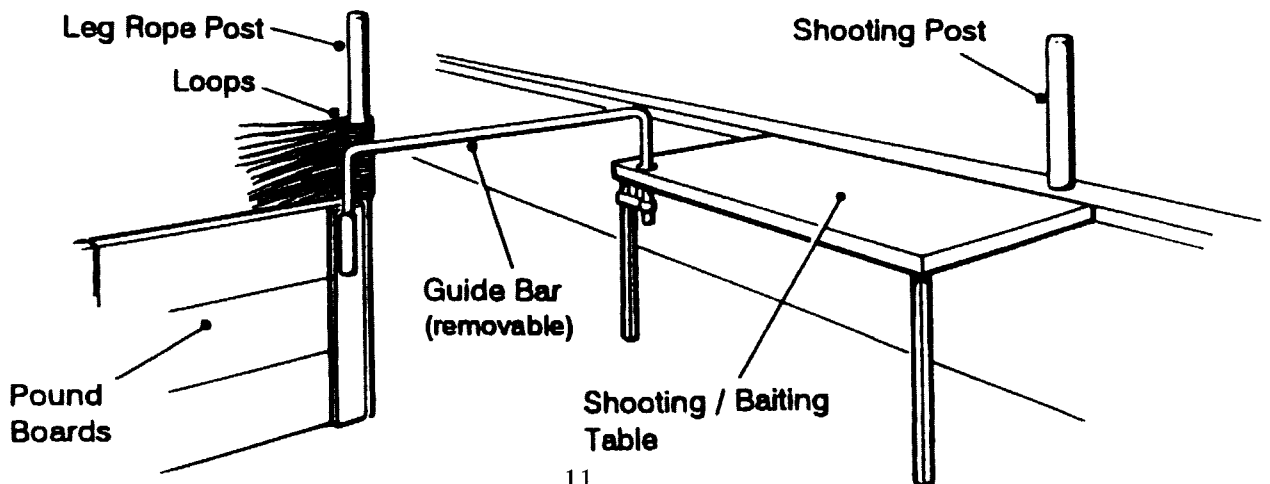
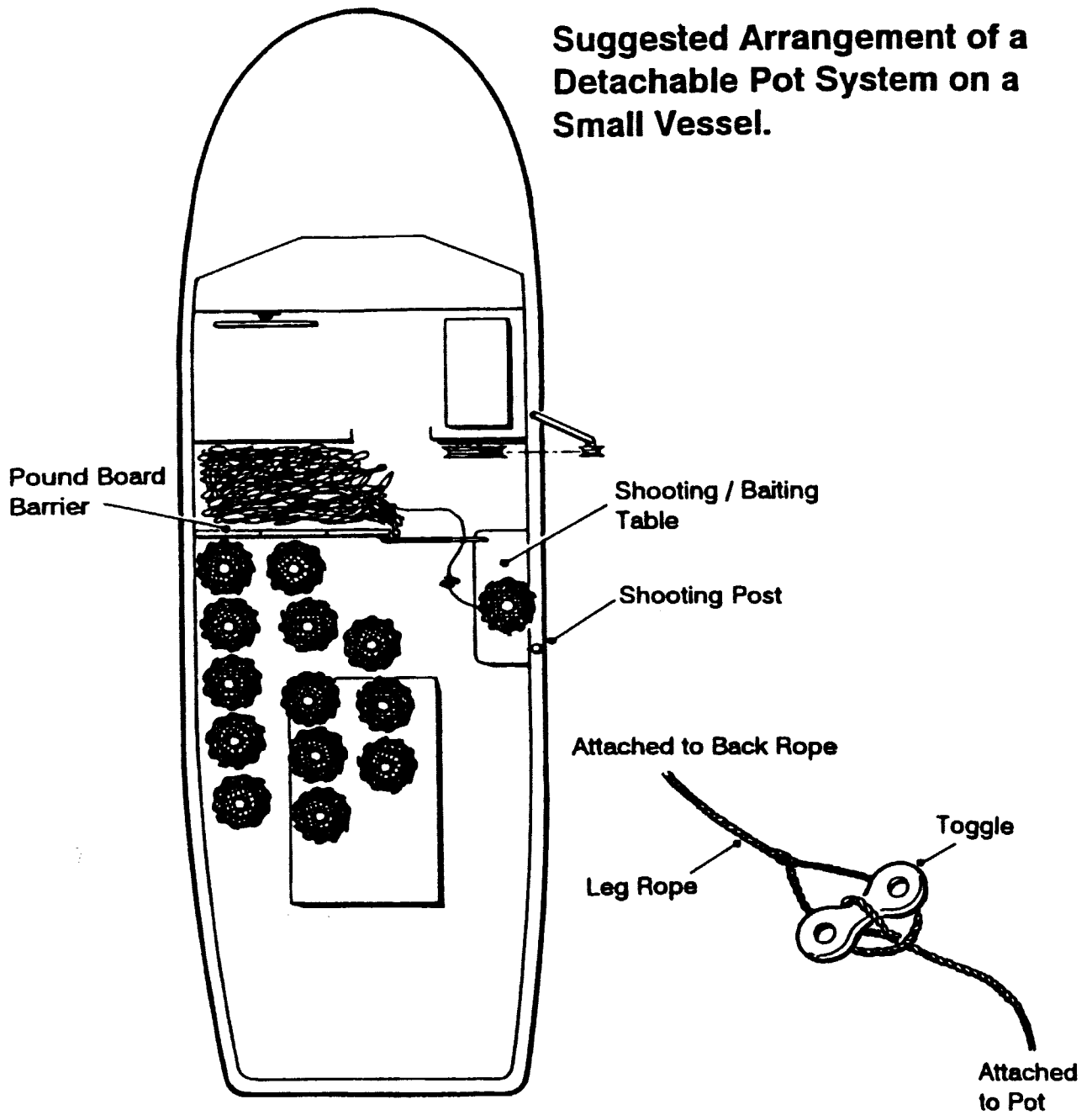
Figure 5 shows a separation system devised by an Orkney skipper who introduced it after one of his crewmen was killed when he became snagged in the back rope while shooting.

1.12 RISK ASSESSMENT

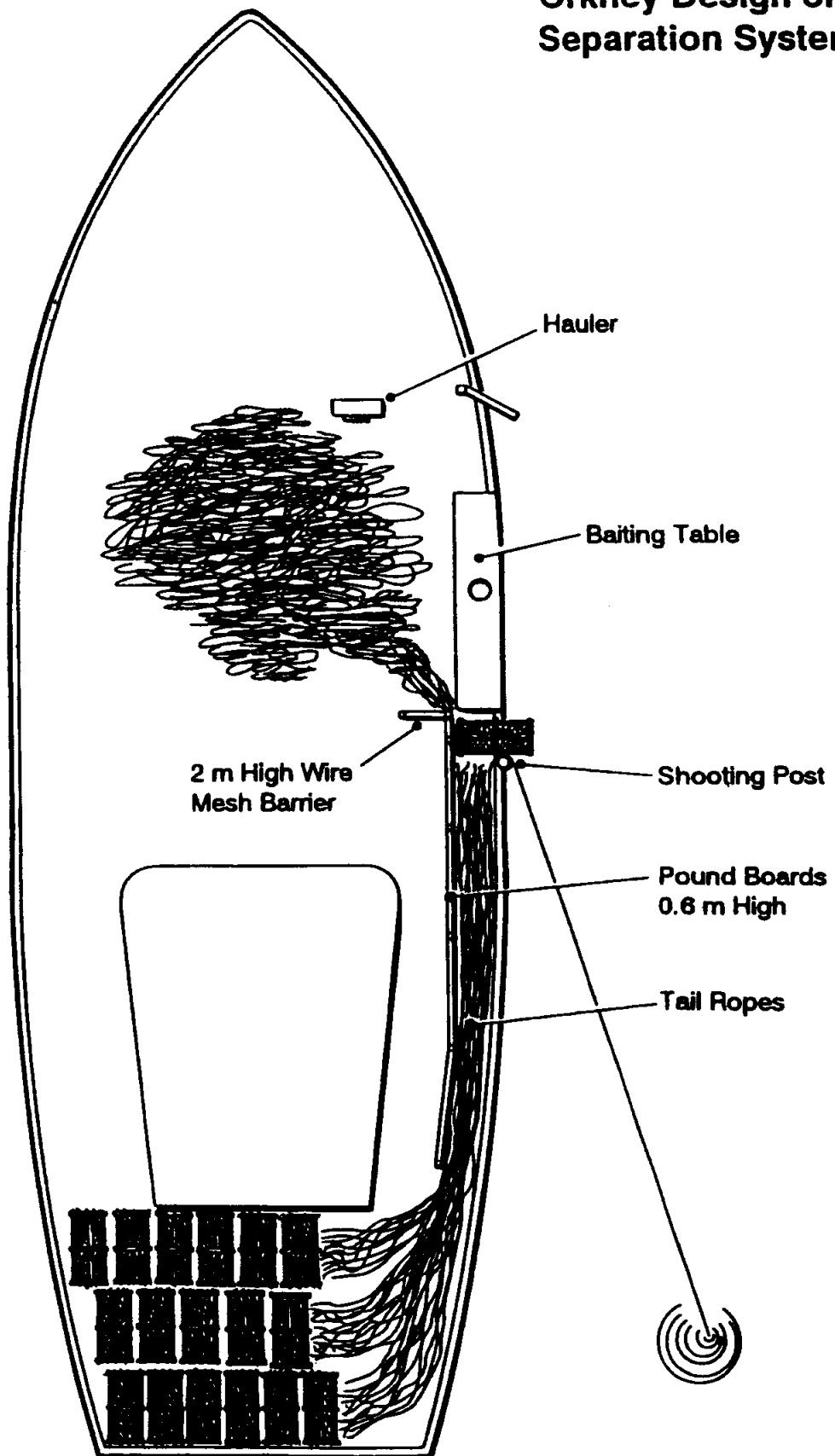
The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997, which came into force on 31 March 1998, require all fishing vessels to carry out a risk assessment.

Figure 4

Suggested Arrangement of a Detachable Pot System on a Small Vessel.



Orkney Design of a Separation System



Advice in complying with the Regulations is given in *Marine Guidance Note MGN 20* entitled *Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997*.

Annex 1 Risk Assessment states, in part:

Under the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997, employers are required to ensure the health and safety of workers and other persons so far as is reasonably practicable, by the application of certain principles. These principles include the avoidance of risks, and the evaluation of unavoidable risks and the taking of action to reduce them.

Specifically, employers are required to make a suitable and sufficient assessment of the risks to health and safety of workers arising in the normal course of their activities or duties, for the purpose of identifying:

- (a) groups of workers at particular risk in the performance of their duties; and*
- (b) the measures to be taken to comply with the employer's duties under these Regulations;*

The assessment should extend to others on board ship who may be affected by the acts or omissions of the employer.

The SFIA's *Fishing Vessel Safety Folder* was produced to assist fishing vessel owners in completing risk assessments. It identifies the hazard, in relation to potting, of a crew member becoming entangled in the back rope when shooting and being dragged overboard.

The appropriate control measures suggested include limiting the number of pots per fleet, sensible shooting speeds, rope barriers, and ensuring all crew members are aware of the dangers.

1.13 LIFEJACKETS AND BUOYANCY AIDS

Fishermen and Safety, which is published by the Maritime and Coastguard Agency (MCA) contains advice regarding lifejackets and buoyancy aids. It points out that although lifejackets are required to be carried on board, in accordance with safety regulations, these may not be suitable while working on deck. However, various buoyancy aids are now available which can improve the chances of survival in the event of falling overboard.

It states:

Perhaps the most suitable buoyancy device currently available is a compact inflatable lifejacket. A 150 Newton [35lbsf (pounds force)] version, with automatic inflation will give good lifesaving properties and will operate even if you are unconscious when entering the water. They are lightweight and unrestricting to wear.

Marine Guidance Note MGN 155(F), which is also published by the MCA entitled *Buoyancy Equipment for Fishermen at Work*, strongly recommends:

- (a) *that a sufficient quantity of suitable CWBE, (Constant Wear Buoyancy Equipment) is carried on board every fishing vessel to ensure that one device is available, at all times, for each person working on deck.*
- (b) *that all fishermen wear suitable CWBE whilst working on deck.*

Dunan Star did not carry any working lifejackets.

SECTION 2 - ANALYSIS

2.1 GENERAL

The majority of crews on potting vessels are well aware when shooting pots, of the hazards involved and take care to avoid them. However, the MAIB continues to receive many accident reports involving potting vessels.

By far the most common accident type is when a crew member becomes caught in a bight of back rope. However, many fishermen on potting vessels are prepared to treat this as an acceptable risk, and as part of the job.

The MAIB firmly believes that until skippers and owners of potting vessels clearly identify and eliminate this particular risk from the system of work, accidents such as this will continue to happen.

Unfortunately, eliminating the risk affects the time taken to haul and shoot the gear and, because time means money, many skippers and owners are reluctant to change their system of work.

2.2 CREW EXPERIENCE

The skipper was an experienced fisherman. However, the casualty was relatively inexperienced.

While it is recognised that all deck crew should gain experience sooner or later in every aspect of the shooting operation, it is significant that this accident happened when the least experienced member of the crew was stationed in the most vulnerable position.

It cannot be said with any certainty that the accident would not have happened had a more experienced crewman (in this case the skipper), been in that position. However, an experienced person would probably have exercised more caution.

It was unwise of the skipper to have the lesser experienced member of the crew in the most vulnerable position during shooting operations.

2.3 PREVIOUS INCIDENT

Two days before the fatal accident, the casualty was involved in an similar accident. This time there were three crew members onboard. However, the least experienced was again, in the most vulnerable position.

The very fact that this accident happened should have given the skipper sufficient warning that the shooting operation was dangerous, and the casualty through his inexperience was vulnerable.

Alternative procedures should have been put in place at that time to prevent the second, and fatal, accident happening, instead of it being looked upon as an acceptable risk which comes with the job.

Had alternative measures been put in place, or had the casualty not been allowed to continue working in a vulnerable position, the accident might have been avoided.

2.4 ACTION BY THE SKIPPER

Once the skipper realised what had happened, he immediately put the main engine to full astern to take way off the vessel. Before he had completed this manoeuvre the casualty had been dragged over the side. There was nothing else the skipper could have done, at that time, to prevent it.

Having grabbed a knife, he cut free the next pot in rotation. This allowed slack in the back rope so that it could be heaved in on the hauler. The skipper's quick thinking enabled the casualty to be hauled back to the surface, where the skipper attempted to cut free the back rope around the casualty's leg.

He managed to cut one pot free, followed by a section of rope which was wrapped around the casualty's chest, but he could not reach the rope which was around his leg. Unfortunately when the skipper cut the rope, it was the inboard end that he was left holding. The weight of the outboard section dragged the casualty under the water.

The skipper acted positively in his attempt to save the crewman's life. His mistaken decision to cut the rope was made with the best intentions and without the luxury of time to consider fully the potential consequences of his actions and the availability of alternative options.

2.5 SHOOTING OPERATION

During the shooting operation, the back rope, which was piled on deck after hauling, was allowed to run free across the deck as the pots were being shot. No safety measure was in place to prevent the crew coming into contact with back rope, making them, and in particular the crewman positioned at the shooting position, vulnerable to being caught in any snags or bights, which might have formed.

Separating the back rope from the crew, in accordance with the advice given in *Potting and Creeling*, will eliminate the danger of crew becoming caught up in the rope when shooting, and would have probably prevented this accident.

2.6 ALTERNATIVE SYSTEM

An alternative system which, during the hauling operation, allowed the back rope to be detached from the pots and stored independently, and which during the shooting

operation kept the rope separated from the crew, would be an appropriate safety measure aimed at preventing a recurrence of the accident.

Such a system, however, especially on smaller vessels such as *Dunan Star*, would require more working space on deck than is presently available after a string of 60 pots has been hauled.

Decreasing the amount of pots in a string would inevitably add to the overall time taken to haul and shoot the original number of pots, but it would create additional working space on deck, which would make the operation safer.

2.7 RISK ASSESSMENT

A risk assessment should have been carried out on board *Dunan Star* long before the accident. An assessment of the risks involved in hauling and shooting the gear would have identified appropriate control measures to prevent someone becoming entangled in a bight of rope and being dragged over the side.

Even if the skipper did not fully understand the concept and application of risk assessment, he could have obtained a copy of the *Fishing Vessel Safety Folder* from the SFIA. This guides fishermen through the process of applying risk assessment step by step, and readily identifies the hazards of someone on board potting vessels being entangled in the back rope and being dragged overboard.

Had a risk assessment been carried out in accordance with *The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997*, the risks identified and control measures adopted by the crew, the accident might well have been averted.

2.8 LIFEJACKETS

Had the casualty been provided with, and worn, a working type lifejacket when working on deck, it would have provided the crewman with additional buoyancy in the water. It may also have prevented him from being dragged under the water at least for a short period of time in which it might have been possible to help him.

It is unknown whether a lifejacket would have led to a positive outcome in this accident. Nevertheless, the crewmember's chances of survival, however slim, would have increased had he been wearing one.

SECTION 3 - CONCLUSIONS

3.1 FINDINGS

1. Until the risk on board potting vessels of becoming entangled in the back rope is eliminated, this type of accident will continue to happen. [2.1]
2. The majority of skippers and owners of potting vessels are reluctant to change their systems of work. [2.1]
3. The casualty was a relatively inexperienced fisherman. [2.2]
4. The lesser experienced crewman was in the most vulnerable position. [2.2]
5. The accident might have been avoided had the casualty been a more experienced fisherman. [2.2]
6. The casualty was involved in an similar accident two days before the fatal one. [2.3]
7. The shooting operation was dangerous, and the casualty was vulnerable. [2.3]
8. Alternative procedures should have been put in place after the previous accident. [2.3]
9. The skipper acted positively in his attempt to save the crewman's life. [2.4]
10. Separating the back rope from the crew will eliminate the danger of becoming snagged in the rope while shooting. [2.5]
11. An alternative deck system, such as the detachable pot/toggle system, would provide the required safety measure. [2.6]
12. Decreasing the number of pots in a fleet would provide sufficient working space on deck to adopt an alternative deck system. [2.7]
13. No risk assessment had been carried out on board *Dunan Star*. [2.7]
14. A risk assessment should have identified the risks involved in shooting the fishing gear. [2.7]
15. Had the risks been identified, and appropriate control measures taken, the accident might have been avoided. [2.7]
16. A lifejacket would have provided additional buoyancy for the casualty when in the water. [2.8]
17. It is uncertain whether a lifejacket worn by the casualty, would have had a positive effect on the final outcome. [2.8]

3.2 CAUSE

The cause of the accident was the casualty becoming entangled in a bight of back rope and being dragged over the side.

3.3 CONTRIBUTORY CAUSES

1. The lack of a safety measure preventing the crew coming into contact with the back rope during shooting operations.
2. The casualty's inexperience.
3. The failure of the skipper to recognise that the shooting operation was unsafe and adopt an alternative procedure after the previous accident.
4. The lack of a risk assessment, which should have identified the risks involved and, the appropriate control measures to be taken.

SECTION 4 - RECOMMENDATIONS

The skipper/owner of *Dunan Star* is recommended to consider:

1. Adopting an alternative deck system on board his vessel, such as a detachable pot/toggle system, which would prevent the crew coming into contact with the back rope during shooting operations.
2. Providing working type lifejackets for the crew when working on deck on board his vessels.

**Marine Accident Investigation Branch
December 2000**