

Report on the investigation of
the loss of two lives and one seriously injured person
on board the Singaporean registered tanker

FR8 Venture

close to the west pilot station to Scapa Flow in the Orkney Islands
on 11 November 2006



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Report No 16/2007
July 2007

The following is a joint investigation report with the Marine Accident Investigation Branch (MAIB) and the Maritime and Port Authority of Singapore. The MAIB has taken the lead role pursuant to the IMO Code for the Investigation of Marine Casualties and Incidents (Resolution A.849(20)).

Extract from
The United Kingdom Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2005 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able Bodied seaman
dwt	-	deadweight
ETA	-	Estimated time of arrival
ISM	-	International Safety Management
m	-	metre
mb	-	millibar
MCA	-	Maritime and Coastguard Agency
OS	-	Ordinary seaman
RMA	-	Radio Medical Advice
RNLI	-	Royal National Lifeboat Institution
rpm	-	Revolutions per minute
SMS	-	Safety Management System
UTC	-	Universal Time Co-ordinated
VHF	-	Very high frequency

Flying bridge - raised walkway above the main deck running from the after accommodation superstructure to the fore part of the ship; mainly fitted to tankers.

Freeboard - height that outboard edge of the deck is above the waterline.

Hawse pipe - pipe leading from the windlass to the outside of the hull, through which the cable passes to the anchor; located in the ship's bow on either side of her stem.

Race - strong and rapid current in a small area of the sea; more especially when accompanied by disturbed water.

Significant wave height - the average height (trough to crest) of the one-third highest waves valid for the indicated 12 hour period.

Spurling pipe - steel pipe through which anchor cable passes and leads down from the windlass into the chain locker.

Weigh anchor - lift the anchor.

SYNOPSIS

All times are UTC

At about 1220 on 11 November 2006, while outbound from Scapa Flow and transiting the Pentland Firth, the 74,065 dwt Singaporean registered tanker, *FR8 Venture*, shipped two large waves over her bow. This resulted in the death of two able seamen (ABs) and serious injuries to an ordinary seaman (OS), all of whom were working on the forward mooring deck. The waves also caused minor damage to the ship.

From 10 to 11 November, *FR8 Venture* carried out a ship-to-ship transfer with another tanker, *Perseverance*, while at anchor in Scapa Flow, and loaded a full cargo of crude oil. The loading operations were completed at 0536, and *Perseverance* let go from *FR8 Venture* and left Scapa Flow. *FR8 Venture* weighed anchor at about 1054 and the two pilots disembarked near the entrance to Scapa Flow at about 1136. The wind was west to west-north-west and near gale force, with waves of about 4 to 5m high. The ship's freeboard was about 6.6m and spray was being shipped on board. The tidal stream was flowing generally in the same direction as the wind.

After weighing anchor, the bosun and AB Kharva secured the port anchor, and began stowing three loose mooring lines down into the forward storeroom. AB Ravindra and an OS were stowing loose mooring lines away aft. At about 1210, the chief officer told AB Ravindra and the OS to go forward and help the bosun. AB Ravindra joined AB Kharva on the starboard winch platform to lash canvas covers around the mooring wires. The bosun instructed the OS to place a securing wire through the starboard anchor cable. At about 1220, just as the OS turned towards the anchor cable, a large wave was shipped over the bow. The ship pitched into the following trough and then a second larger wave was shipped on board. The two ABs were swept aft, towards and under the flying bridge. The OS was swept aft and came into contact with a protection plate for the forward liferaft. The bosun had managed to cling onto the storeroom door when the first wave was shipped, and then onto the ladder rungs of the foremast as the second wave swept over the foredeck; he remained uninjured.

The bridge team saw the seas being shipped on deck. The third officer released a manoverboard lifebuoy and smoke float from the bridge wing, and the general alarm was sounded, upon which the crew mustered at the emergency station. The OS managed to walk aft until he reached amidships, where he collapsed. All three injured men were taken to the accommodation.

FR8 Venture called Orkney Harbour Control to report the accident and to state that medical assistance would be needed. Orkney Harbour Control then informed Shetland Coastguard of the tanker's emergency. Later, Shetland Coastguard arranged a radio telephone link between the ship's master and a doctor at Aberdeen Royal Infirmary. The Longhope RNLI lifeboat took the local doctor out to meet the ship, but the rough seas prevented the doctor from boarding the ship from the lifeboat. However, the Stornoway Coastguard rescue helicopter was able to transfer her to *FR8 Venture*.

Once onboard the vessel, the doctor determined that the two ABs had died of their injuries and the OS should be taken to hospital. The helicopter returned to the ship, landed an Orkney Harbour pilot and airlifted the doctor and the OS to Aberdeen Royal Infirmary. The ship returned to Scapa Flow and anchored there at about 1800.

The investigation identified the following safety issues:

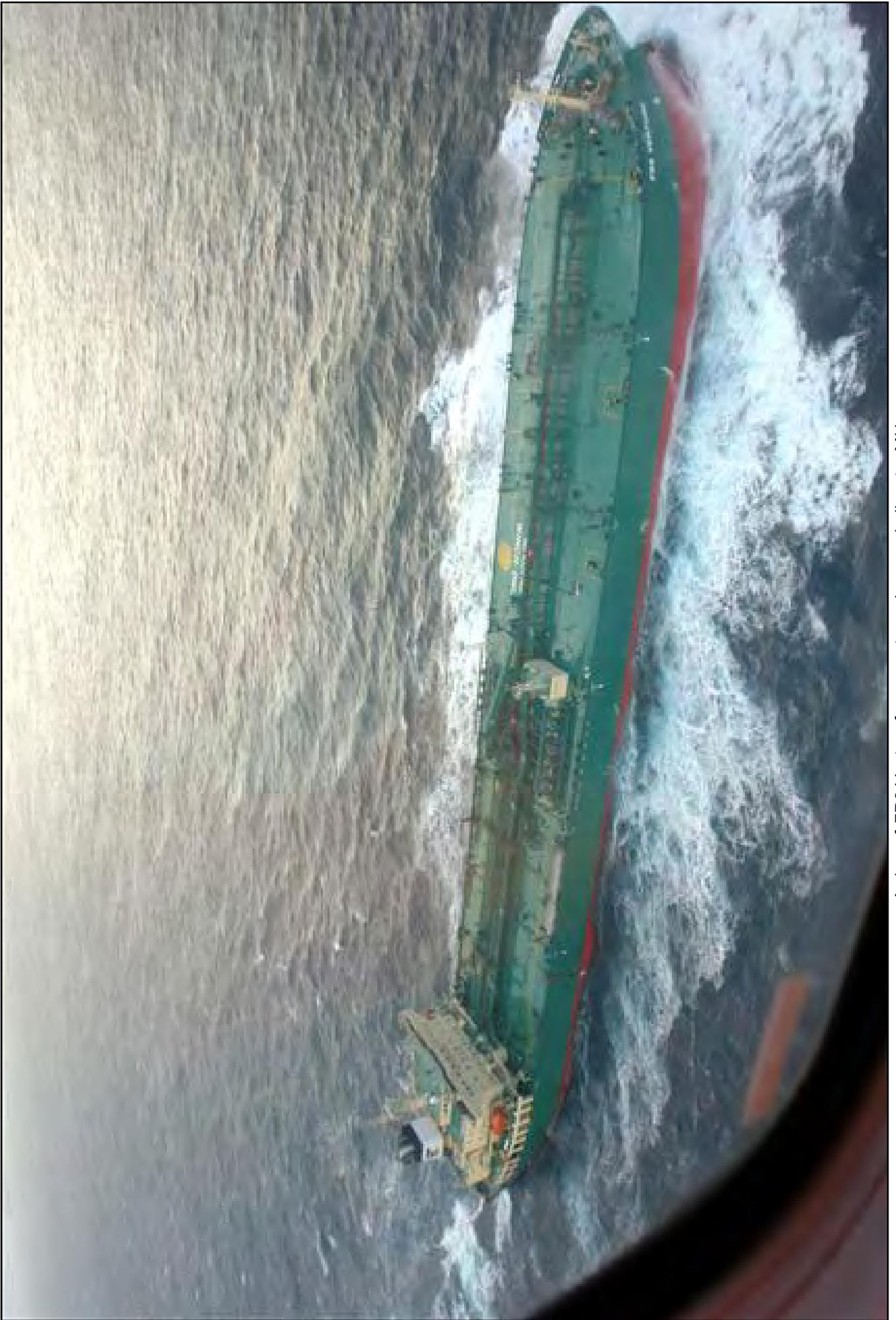
- The two large waves that were shipped over the bow could not have been considered abnormal and should have been expected in the prevailing weather conditions.
- The master should have delayed the sailing so that the ship could have been secured for sea in sheltered waters.
- Having decided to leave the shelter of Scapa Flow before the foredecks were secured for sea, the master's assessment of the position by which the crew should have been clear of the foredeck of the ship allowed little margin for error. This should have prompted an effective plan of action.
- The plan could have concentrated the crew forward earlier, leaving the stowing of the after ropes until the fore part of the vessel had been secured.
- The plan should have prompted the need for precautionary measures, such as considering the option of turning the ship away from the weather, when safe and practicable to do so, to secure the anchors.

The managers of *FR8 Venture* have reviewed and amended their company SMS procedures for working on deck in heavy weather. The relevant sections are as follows:

- *The priority, which Master and Deck Officers should have is to ensure that when the vessel is either arriving or leaving port, the unsecuring or securing should be done as later or early as possible (basis whether vessel is arriving port or departing port) to ensure that crew are on deck and exposed to the elements for the least possible time.*
- *When departing port, most of the securing should be done prior leaving the berth or anchorage.*
- *When the vessel has left the berth or anchorage, the guiding principle should be to secure the vessel from forward to aft.*
- *It would be prudent to concentrate the manpower in one locale rather than spreading them out and trying to secure all over as a concentrated effort will mean a quicker securing [sic].*

The MCA has issued a Safety Alert, which gives a brief outline of the accident and draws attention to the contents of Chapter 3 of the Admiralty Sailing Directions North Coast of Scotland Pilot, which warns mariners of strong tides, with large waves that frequently occur in the area of Pentland Firth.

In light of the actions taken as a result of this accident, the MAIB has issued no safety recommendations.



A view of FR8 Venture from coastguard rescue helicopter MU

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *FR8 VENTURE* AND ACCIDENT (Photograph 1)

Vessel details

Registered owner	:	FR8 Shipmanagement Pte Ltd
Port of registry	:	Singapore
Flag	:	Singapore
Type	:	Panamax crude oil tanker
Built	:	2006 in Jingjiang, China
Classification society	:	American Bureau of Shipping
Construction	:	Double hull/steel
Length overall	:	228.6m
Gross tonnage	:	42,010
Deadweight	:	74,065 tonnes
Engine type and power	:	B&W diesel engine of 11,300kW at 105rpm
Service speed	:	15.5 knots
Other relevant info	:	Approximate sailing freeboard of 6.6m

Accident details

Time and date	:	1220, 11 November 2006
Location of incident	:	Latitude 58° 45.1'N Longitude 003° 11.01'W near the west pilot station for Scapa Flow
Persons on board	:	24
Injuries/fatalities	:	Two fatalities and one serious injury
Damage	:	Minor damage to Suez light davit and to both windlass gear wheel guards

1.2 BACKGROUND

1.2.1 The Orkney Islands

The Orkney Islands is an archipelago, situated 10 miles north of the coast of the mainland of Scotland. It consists of over 70 islands, of which 20 are inhabited. The largest island is known as Mainland and has an area of 202 square miles (**Figure 1**).

1.2.2 Scapa Flow

Scapa Flow is a small inland sea within the Orkney Islands, sheltered by the islands of Mainland, Graemsay, Burray, South Ronaldsay and Hoy. There is a marine oil terminal on the island of Flotta, where crude oil is received from oil fields by pipeline, and loaded into large tankers for onward shipment. Scapa Flow has been increasingly used as an ideal location to carry out ship-to-ship transfers, as it provides shelter in still deep waters. Cargoes can be transferred from shuttle tankers to conventional tankers, such as *FR8 Venture*, for long haul voyages.

To the east and west of the island of Swona, there are two deepwater approach tracks for Scapa Flow, which are recommended by Orkney Harbour Authority for tankers under pilotage. Scapa Flow is entered through Sound of Hoxa, the narrowest part of which is between Nevi Skerry and Roan Head.

1.2.3 Pentland Firth

Pentland Firth separates the Orkney Islands from the Scottish mainland. It is entered from the west between Dunnet Head and Tor Ness, and from the east between Duncansby Head and Old Head. The two largest islands within the firth are Stroma and Swona.

Tidal streams are very significant to ships navigating in or through Pentland Firth and need to be considered at all times. The tidal streams meet a number of obstructions causing eddies and races, which can be very strong and violent in certain areas. Tidal streams have been reported to run up to 16 knots near to the Pentland Skerries. Warnings advise that laden tankers, not bound to or from Flotta or Scapa Flow, should not use Pentland Firth in adverse weather conditions. These warnings are given in the Admiralty Sailing Directions for the North Coast of Scotland and on the relevant Admiralty charts.

Warnings, with respect to tidal streams, are also given in Orkney Harbour Authority's *Recommendations on navigation for vessels bound to or from Scapa Flow*. These recommendations are sent to visiting tankers before they reach Pentland Firth.

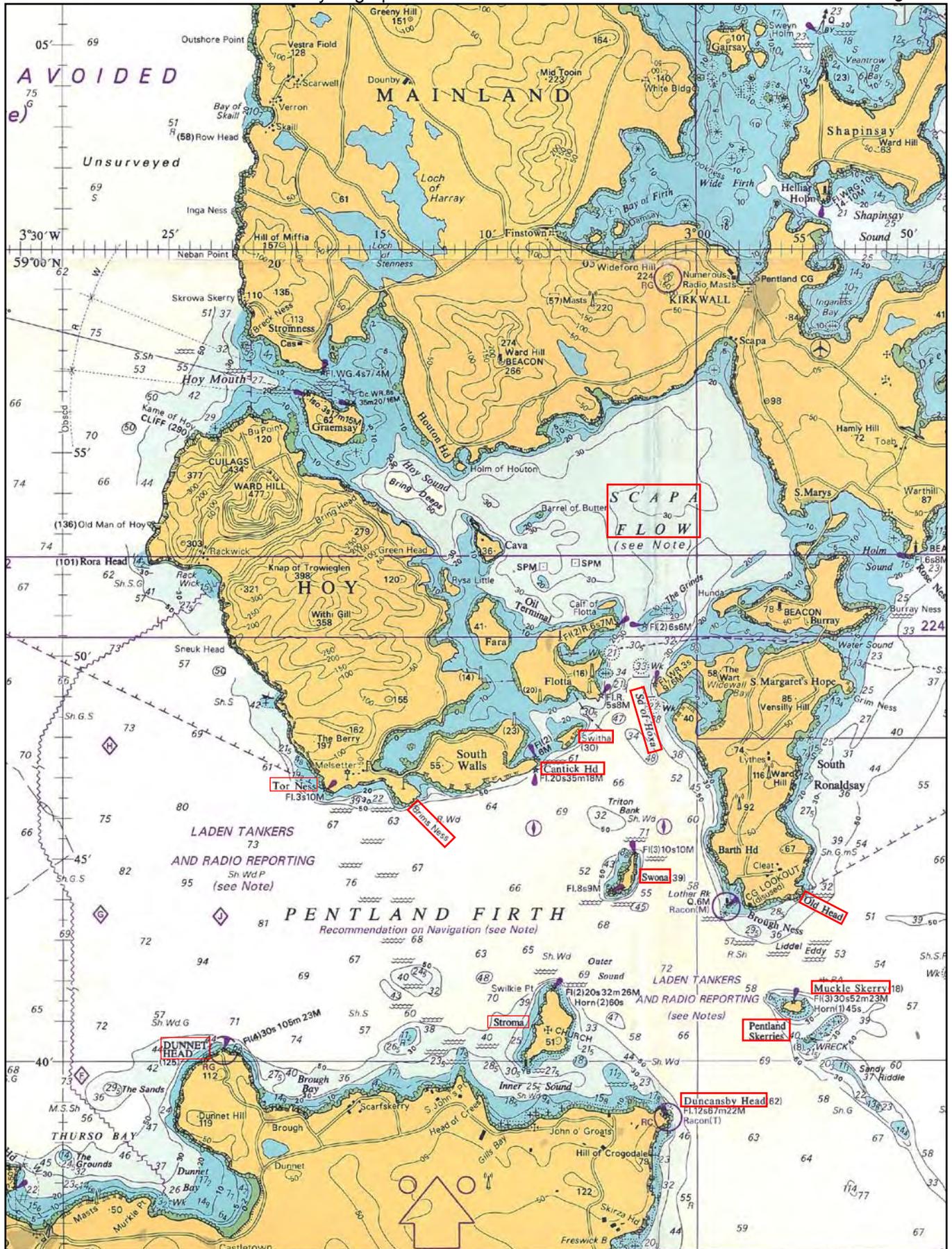
1.3 NARRATIVE

1.3.1 Events leading up to the accident

In the early hours of 5 November 2006, *FR8 Venture* arrived at the port of Hamburg with a full cargo of oil. Discharge operations of the cargo finished at 0000 on 7 November and, shortly afterwards, she sailed, in ballast, for Scapa Flow, in the Orkney Islands. The ship was designated to carry out a ship-to-ship transfer of a full load of crude oil, which she was to carry to Houston, in the United States.

Reproduced from Admiralty Chart 1954 by permission of the Controller of HMSO and the UK Hydrographic Office

Figure 1



An Orkney Harbour Authority pilot boarded the ship at 1710 on 8 November, and she entered Scapa Flow through the Sound of Hoxa. At 1844, the ship anchored using her port anchor and was brought up to 10 shackles on deck. During the day of 9 November, the loading hoses and fenders were brought out to the ship. The hoses were connected to the manifolds and the fenders were made fast to the ship's starboard side.

At about 0600 on 10 November, the tanker, *Perseverance*, was manoeuvred towards *FR8 Venture*'s starboard side, and, by 0748, the mooring lines had been made fast between the two ships. All mooring lines belonged to *Perseverance*, with the exception of two springs, which were deployed by *FR8 Venture*. (Before entering Scapa Flow, loose mooring lines had been flaked out on deck, both fore and aft, in case of need.) After the cargo hoses had been connected between the two ships, the transfer of the crude oil from *Perseverance* to *FR8 Venture* began.

At about 0400 on 11 November, the bosun, the OS and AB Kharva (**see Section 1.5.2**) were awoken and told to go out on deck and assist the other two ABs in the preparation for the completion of cargo transfer. Loading finished at 0536, after which the hoses were drained and disconnected from the other ship. *Perseverance* let go from *FR8 Venture* and the two ships were clear of one another by 0830.

After the two pilots (one of whom was a trainee) had taken *Perseverance*¹ to Sound of Hoxa, they returned to *FR8 Venture* and boarded her at about 0930. The tug *Erland* was attached aft to act as the active escort out of Scapa Flow; tug *Einar* was to act as the passive escort during the outbound passage.

While the bridge and engine room teams were working through their respective pre-departure checklists, the deck hoses and fenders were taken away from the ship by the tug *Harald*; this was completed by 0954. There was no formal pre-departure brief between the master, the deck officers and the bosun.

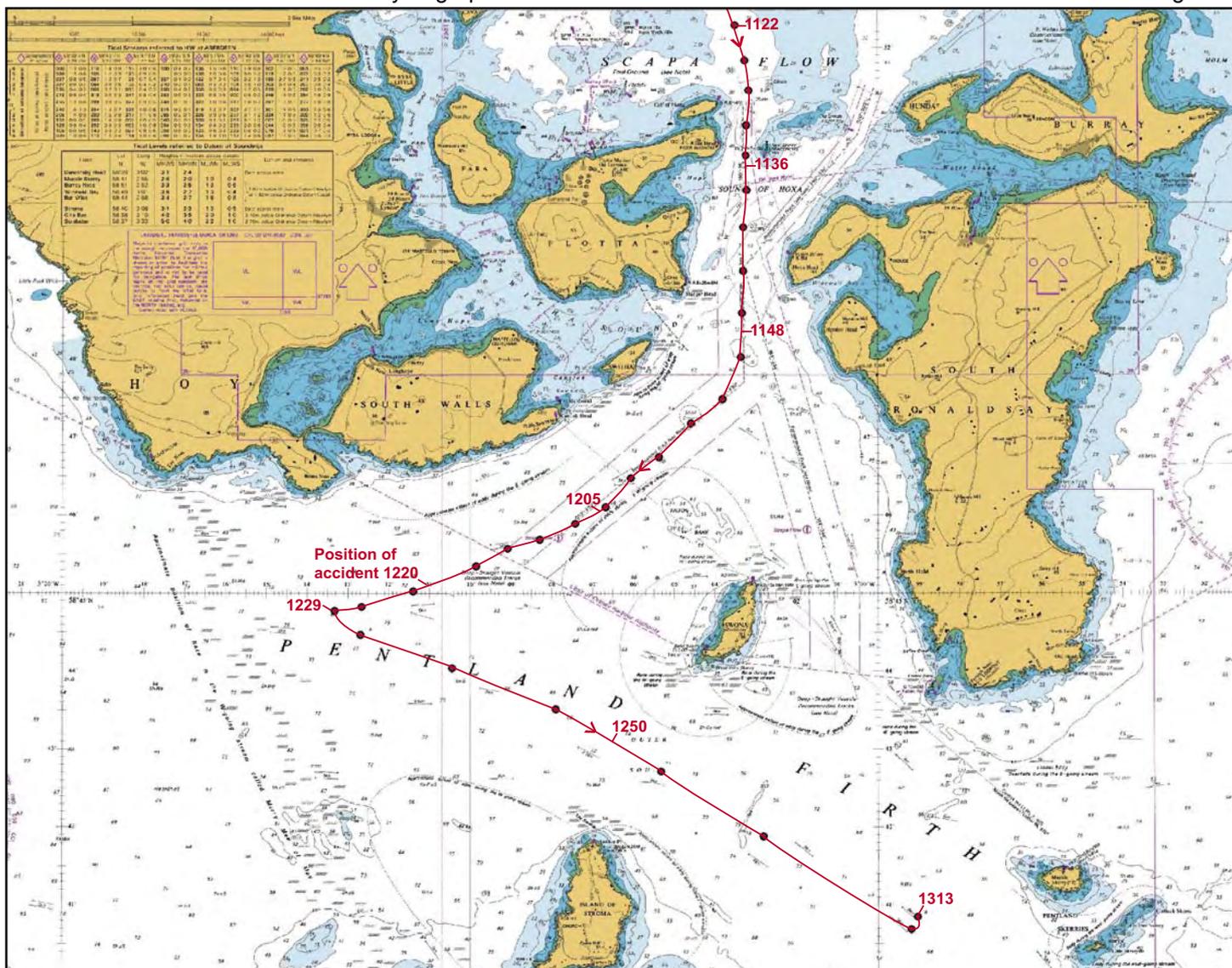
One of the three ABs went to the bridge and acted as helmsman; he remained there throughout the incident.

At about 1018, following completion of the cargo survey and paperwork, the forward mooring party, which consisted of the chief officer, the bosun and AB Kharva, went forward and began weighing the port anchor. The anchor was aweigh at 1054, and the ship turned towards Nevi Skerry. The forward mooring party then began to manhandle the loose mooring ropes down into the forward storeroom.

The OS and AB Ravindra helped the pumpman and deck cadet to secure the loading manifolds amidships, and then went aft to stow the after mooring lines away. At about 1120, a member of the bridge team told them to rig the pilot ladder on the port side. Shortly afterwards, the master told the bosun to secure the port anchor and, several minutes later, the bosun confirmed to the bridge that this had been done (**Figure 2**).

At about 1131, the trainee pilot advised the master on courses to steer to counteract the tidal streams while navigating in the deepwater route leading to Pentland Firth. The ship's engine was slowed down to dead slow ahead in preparation for the pilots'

¹ Note: *Perseverance* left Scapa Flow and travelled east through Pentland Firth into the North Sea.



Track of FR8 Venture from 1122 to 1313

disembarkation. Just before the pilots left the bridge to disembark, the trainee pilot advised the master to call Orkney Harbour when he reached the harbour limit, and, after they had disembarked, to bring the ship's speed up, to which the master agreed.

The attached escort tug *Erland* was let go from the tanker by the OS and AB Ravindra, after which they brought in the pilot ladder and stowed it away. Once this had been done, they continued to stow the after mooring lines away. At 1136, the two pilots disembarked onto the pilot launch in Sound of Hoxa. Shortly afterwards the passive tug stopped and stood by off Stanger Head.

The master took the con as the pilots left the bridge, and the ship continued on its southerly course. The engine control was placed on full ahead manoeuvring, which was 87 rpm. At about 1148, when the island of Switha was abeam to starboard, the master began altering course onto the next recommended track of 230°. The ship's speed over the ground was about 11.5 knots and the engine speed setting was further increased to 92 rpm and then, shortly afterwards, to 94 rpm (**Figure 2**).

At about 1205, the master ordered the course to be altered to 240°, with the aim of eventually reaching a course of 270°, on Latitude 58° 45'N. At 1207, he ordered a further course alteration to 250°. The speed over the ground slowly decreased to about 9.5 knots as the ship headed more into wind and tide.

At about 1210, the chief officer left the foredeck and proceeded to the poop deck, where the OS and AB Ravindra were still stowing the aft mooring lines away. He told them both to go forward and help the bosun and AB Kharva.

At about 1213, the master told the third officer to instruct the bosun to secure the starboard anchor. The third officer relayed the instruction to the bosun by hand-held VHF radio. The master then told the bosun by hand-held VHF radio that, when he had finished forward, he should take the fire hoses and nozzles on the exposed deck out of their fireboxes and then lash the boxes. He also instructed the third officer that, after he had lunch, he should take the lifebuoys situated on the exposed deck out of their brackets in view of the expected heavy weather over the next 2 to 3 days.

When the OS and AB Ravindra arrived forward, the latter joined AB Kharva on the platform on the aft side of the starboard winch to help him lash the canvas covers around the mooring wires (**Photograph 2**). The OS had joined the bosun who was standing behind the storeroom door. The bosun told the OS to place a wire lashing through the starboard anchor cable. Just as the OS made a move towards the starboard anchor cable, the first of two large waves were shipped over the bow.

No one saw the waves approaching. However, the bosun managed to cling onto the storeroom door during the shipping of the first wave. The ship's bow then pitched into the deep trough between the first and second wave. The bosun moved aft and managed to cling on to the ladder rungs on the after part of the foremast as the second wave was shipped on board (**Photograph 3**).

AB Ravindra and AB Kharva were swept off the winch platform and forced uncontrollably aft until they came to rest under the flying bridge. The OS was swept aft and landed on the protection plates for the liferaft (**Figure 3**).

As soon as the water had dispersed, the bosun went onto the flying bridge and called the bridge.

1.3.2 Post accident events

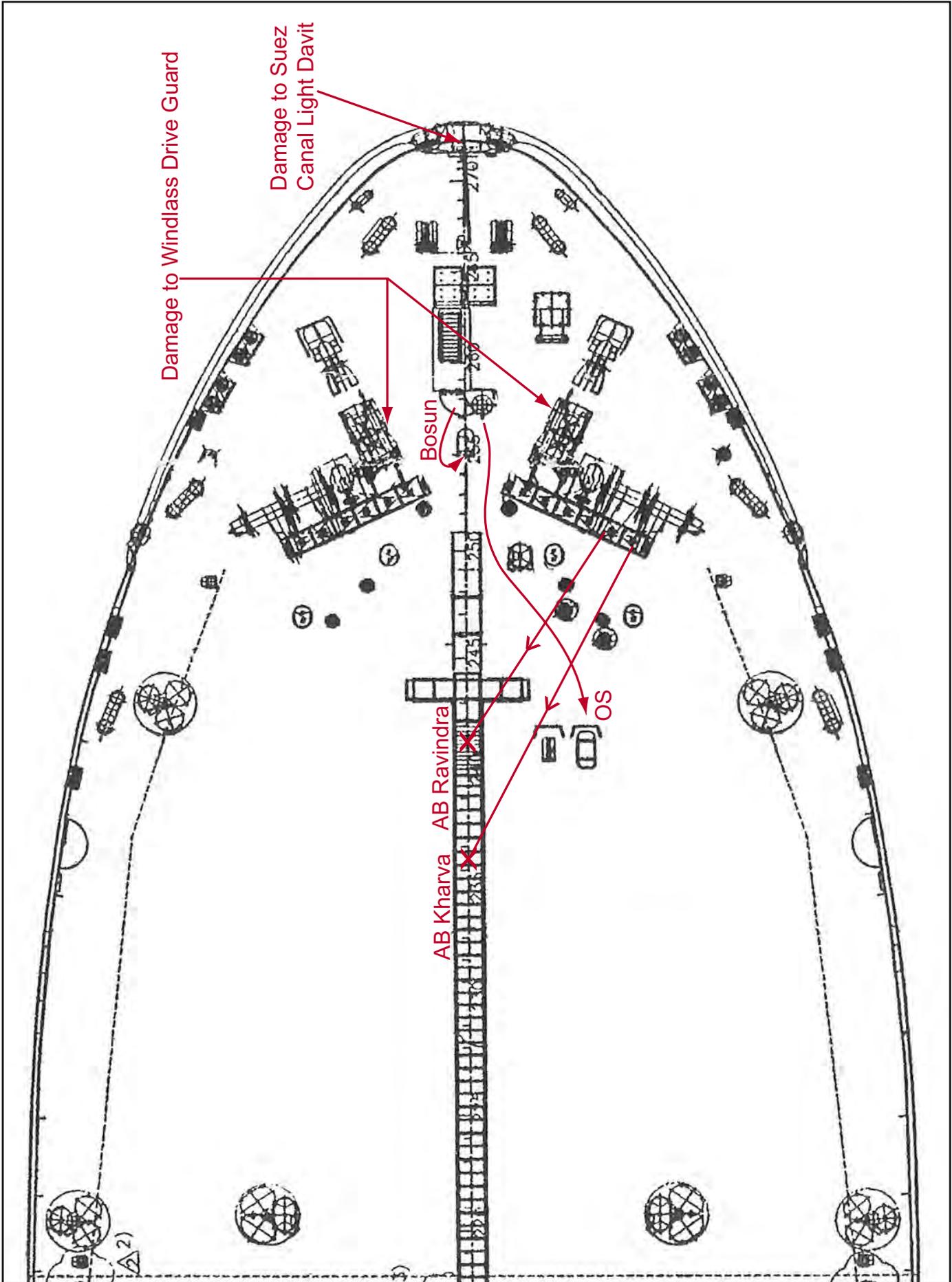
At 1220, the master saw the two waves being shipped on board. The water on deck from the waves reached as far aft as the ship's cargo manifolds. The master called the bosun on his hand-held VHF radio a number of times. The bosun shouted into his own set calling the bridge, but the master was unable to understand what he was saying. However, from the urgency in the bosun's voice and having seen the waves being shipped on board, the bridge team realised that there had been an accident. The bridge team concluded that someone might have been swept overboard so the third officer went out onto the starboard bridge wing and released the manoverboard lifebuoy and smoke float. When the third officer returned to the wheelhouse, he asked the master if he should sound the general alarm. The master gave him permission to do so. After the general alarm had been sounded, the rest of the crew mustered at the emergency station.



A reconstruction of the positions in which AB Ravindra and AB Kharva were standing



Photograph of the bosun showing how he clung onto the foremast ladder rungs



Plan of foredeck showing movement of the four seamen and damage to the ship

At 1224, the master told the second officer to go forward and find out what had happened. The general alarm had alerted the chief officer and he also made his way forward. The deck cadet and the pumpman, both of whom had been working at the cargo manifolds, joined the officers at the scene. They found AB Ravindra conscious and wedged between the steps leading up to the flying bridge (**Photograph 4**). AB Kharva was found unconscious, laying further aft among the pipework under the flying bridge (**Photograph 5**).

After the water had dispersed, the OS managed to stand up and walk aft towards the ship's accommodation. However, he collapsed on reaching the area of the cargo manifolds.

The chief officer reported to the bridge that there were three injured people and he advised the master to turn the ship around. The master assessed the available sea room in which he had to turn the ship around, and, at 1229, he ordered the helmsman to turn the wheel to hard-to-port. At the same time, the third officer contacted Orkney Harbour Control by VHF radio and told them that they had injured crew members forward, the ship was being turned around and that further information would be given in 10 minutes once more details were known. More crew members arrived on the foredeck with medical kits and stretchers, with which to carry the injured men aft to the accommodation.

Soon after receiving advice about the accident onboard *FR8 Venture*, Orkney Harbour Control watch officer contacted Shetland Coastguard and told them that the ship had had an accident and that she may need medical assistance. He also gave the ship's details and position.

At 1237, the master handed the con over to the third officer and went on deck to see the injured men. He returned to the bridge 5 minutes later having confirmed the extent of the three crew members' injuries and that no one had been swept overboard.

At 1243, *FR8 Venture* called Shetland Coastguard to advise that medical assistance was required as the accident had resulted in one possible fatality and serious injury to two other men.

Shortly afterwards, Orkney Harbour Control informed Shetland Coastguard that an attempt would be made to embark a pilot onto *FR8 Venture* and bring the ship back into Scapa Flow. It would take about an hour for the launch to reach the ship, which should make her way to the west pilot station. Shetland Coastguard informed the ship of Orkney Harbour Control's intentions and that she should be at the pilot station for about 1345.

At 1246, coastguard rescue helicopter *MU* was scrambled from Stornoway and proceeded towards *FR8 Venture*. (This helicopter was chosen as the flying time to the ship would be quicker than the flying time for the helicopter based at Sumborough in the Shetlands.)

At 1250, *FR8 Venture* was between the islands of Stroma and Swona, on a south-easterly heading, travelling at a speed of 14 knots.

At 1252, Shetland Coastguard arranged a radio telephone link between the master and a doctor at Aberdeen Royal Infirmary (**see Section 1.8**).



A crew member demonstrates how AB Ravindra was found



A crew member demonstrates how AB Kharva was found

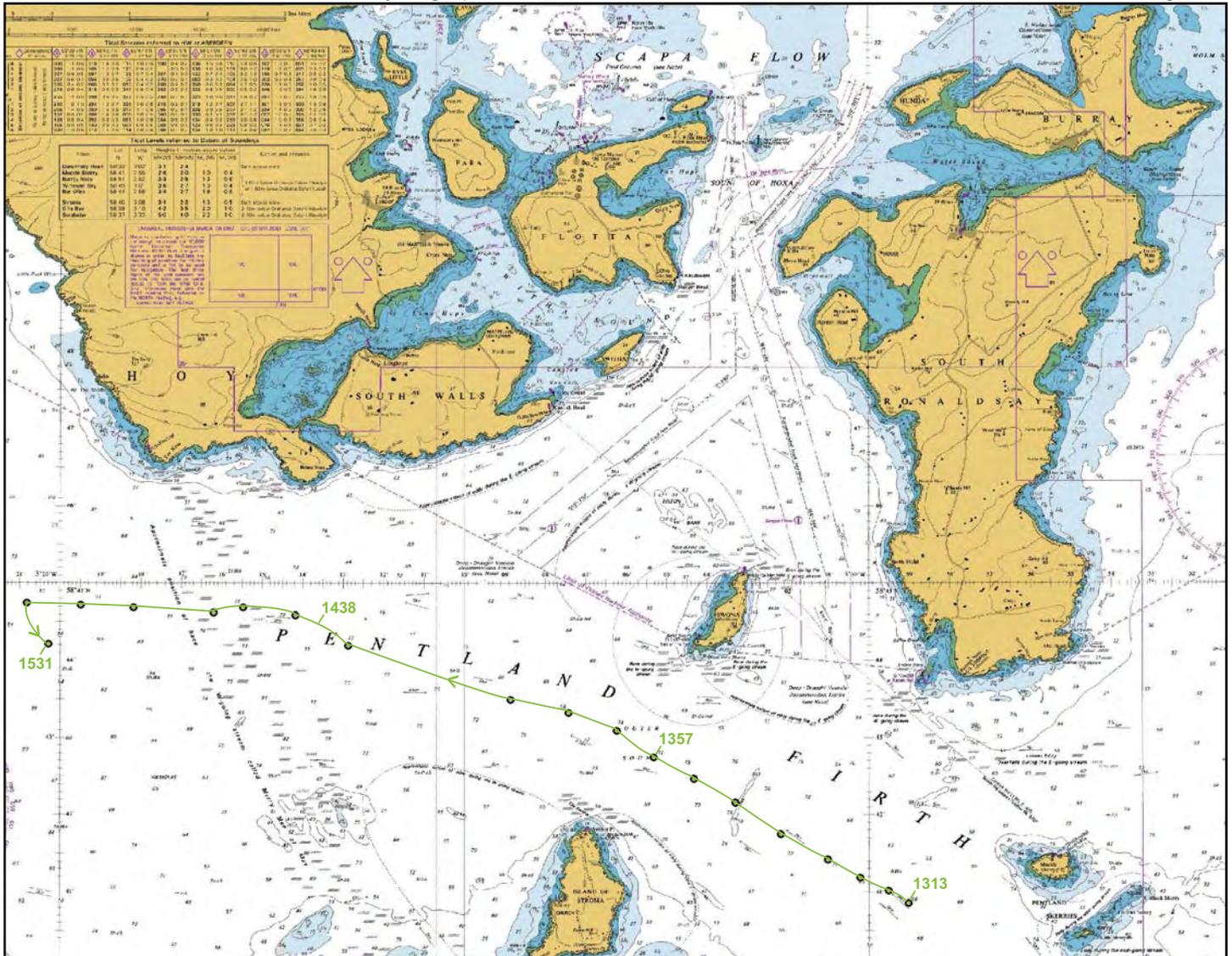
At 1258, Shetland Coastguard used a pager to contact the RNLI Longhope Lifeboat's deputy launch manager's pager. When the deputy launch manager subsequently responded, he was given the details of the emergency and was asked if there was a local locum doctor who could be taken out to *FR8 Venture*. The deputy launch manager replied that he would try to establish if the locum doctor would be prepared to go to *FR8 Venture* in the RNLI lifeboat.

At 1310, when *FR8 Venture* was between Pentland Skerries and Duncansby Head, the master altered course to port and began heading north westerly towards the west pilot station (**Figure 4**).

At 1357, when the ship was passing between the islands of Stroma and Swona, the pilot launch entered Pentland Firth to meet her. However, it was assessed that, due to the rough seas, it was unsafe for the pilot to board the ship from the launch. The pilot launch, therefore, returned to Flotta and *FR8 Venture* aborted her approach to the pilot boarding area.

Reproduced from Admiralty Chart 2162 by permission of the Controller of HMSO and the UK Hydrographic Office

Figure 4



Track of *FR8 Venture* from 1313 to 1531

At 1410, the coastguard rescue helicopter transferred the doctor and her medical equipment from the Longhope Lifeboat to the ship (**Photograph 6**). By 1438, the doctor and her equipment had been landed on the ship's port quarter together with the helicopter's winchman. The helicopter then left the scene and flew to Wick to refuel.

Photograph 6



Coastguard rescue helicopter approaches *FR8 Venture*'s port quarter

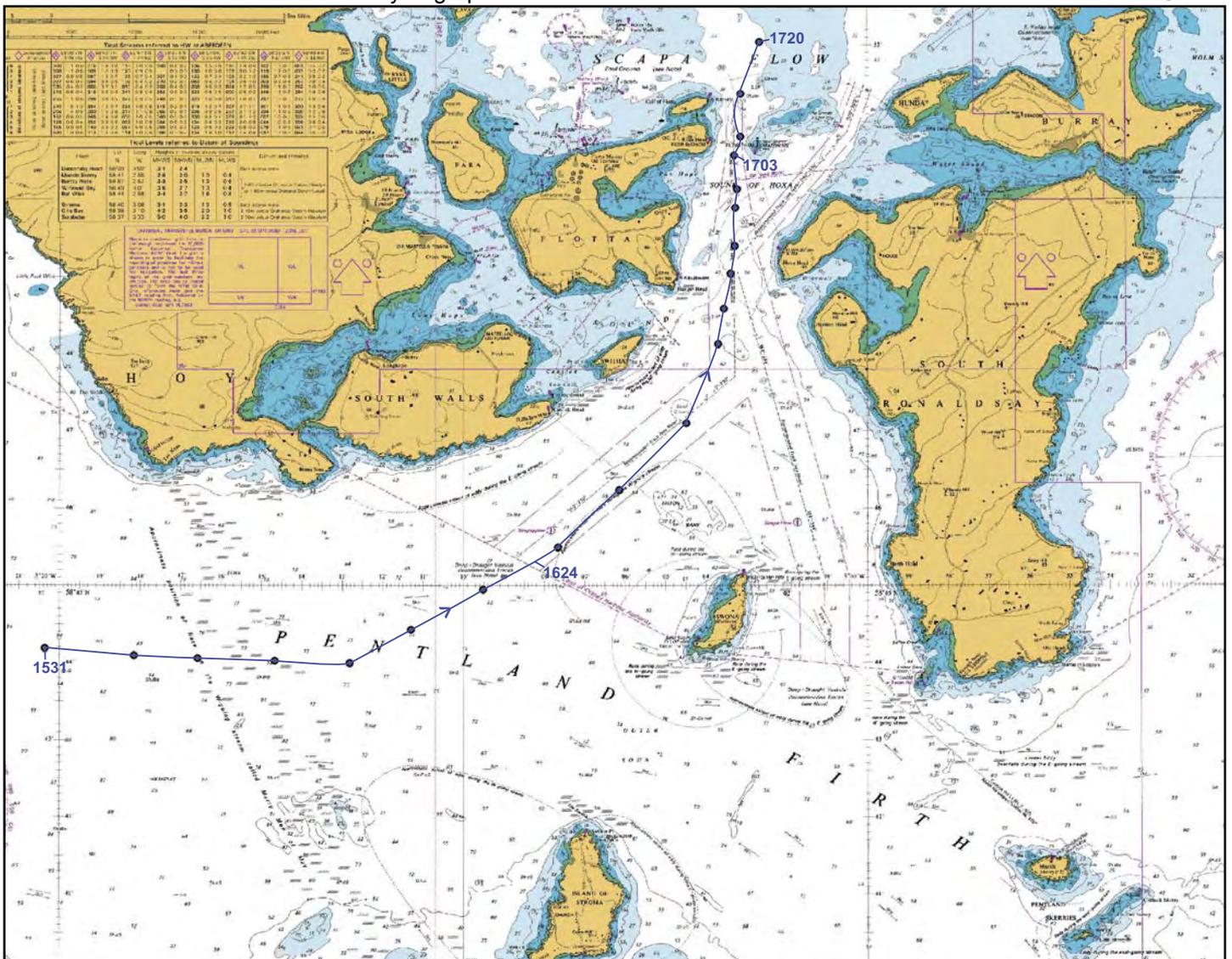
Once onboard *FR8 Venture*, the doctor determined that both ABs had died. The OS was then strapped into one of the helicopter stretchers ready to be evacuated from the ship.

By 1523 the helicopter had returned to the area and had landed at Flotta airstrip to pick up the pilot for the ship. Shortly afterwards, the helicopter took off and made its way back to *FR8 Venture*.

At 1526, *FR8 Venture* was about 4 miles south-west of Tor Ness. At this time, the ship reversed her course and steadied onto an easterly heading towards the west pilot station for Scapa Flow (**Figure 5**).

At 1538 the helicopter winched the pilot onto the deck of *FR8 Venture*. The OS, the doctor, her equipment and the winchman were then winched up into the helicopter. The helicopter then began its flight to Aberdeen Royal Infirmary, arriving there at about 1640.

At 1624, *FR8 Venture* entered Orkney Harbour limits, and at 1645 the tug *Erland* was made fast to the stern of the ship. At 1703, the ship passed Nevi Skerry and, at 1757, she anchored in the northerly part of Scapa Flow.



Track of FR8 Venture from 1531 to 1720

At about 2000 the police boarded the ship and the master was tested for alcohol, the result of which proved negative.

At about 2315, the bodies of AB Ravindra and AB Kharva were taken ashore.

FR8 Venture remained in Scapa Flow until the evening of 13 November 2006, when she resumed her passage to Houston, with three replacement crew members on board.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Meteorological Office report

The following is a summary of a report produced by the UK Meteorological Office for the MAIB.

At 0600 on 11 November 2006, the general situation was a large and deep depression (or low) of 971mb centred 100 miles east of the coast of Iceland. The low moved slowly eastwards until, at 1200, it was 150 miles east of Iceland with a central pressure of

974mb. The low generated a large swathe of gale or severe gale force winds in the North Atlantic during 10 and 11 November with winds reaching storm force in many areas.

The shipping weather forecast for the area and time of the accident was westerly winds of force 7 to severe gale force 9, veering north-westerly in the afternoon.

- Force 7 equates to a wind speed of between 28 and 33 knots and a probable mean wave height of 4m and a maximum height of 5.5m.
- Force 8 equates to a wind speed of between 34 and 40 knots and a probable mean wave height of 5.5m and a maximum height of 7.5m.
- Force 9 equates to a wind speed of between 41 and 47 knots and a probable mean wave height of 7m and a maximum height of 10m.

An assessment of wind and weather for west Pentland Firth on 11 November 2006, at Latitude 59° 00'N Longitude 003° 40'W, gave the following observations:

- from 0600 to 1200 the wind slowly increased from 29 knots to 33 knots (force 7), and the significant wave height increased from 5.1m to 5.8m (very rough); and
- from 1200 onwards the wind veered to the west north-west and increased to 35 knots (force 8) causing the significant wave height to further increase from 5.8m to 6.4m (high seas).

1.4.2 Local observations

FR8 Venture's anemometer was indicating relative wind speeds of between 30 and 35 knots just before the disembarkation of the pilots at 1136.

During the morning and afternoon of 11 November 2006, an anemometer located at Sandy Hill, on the island of South Ronaldsay, recorded average wind speeds of between 35 and 45 knots, with gusts over 50 knots.

1.4.3 Tidal stream

The tides on 11 November 2006 were 2 days before neaps. The tidal streams in Pentland Firth began to flood between 1000 and 1100. **See Figure 6** for the tidal streams at the time of the accident.

1.5 FR8 VENTURE

1.5.1 The ship

(Figure 7 refers)

FR8 Venture was a Panamax, double-skinned, crude oil tanker.

The vessel had a flush main deck from aft to the foremost part of the ship. The bulwarks on either side of the stem and around the bow were just over 1m in height.

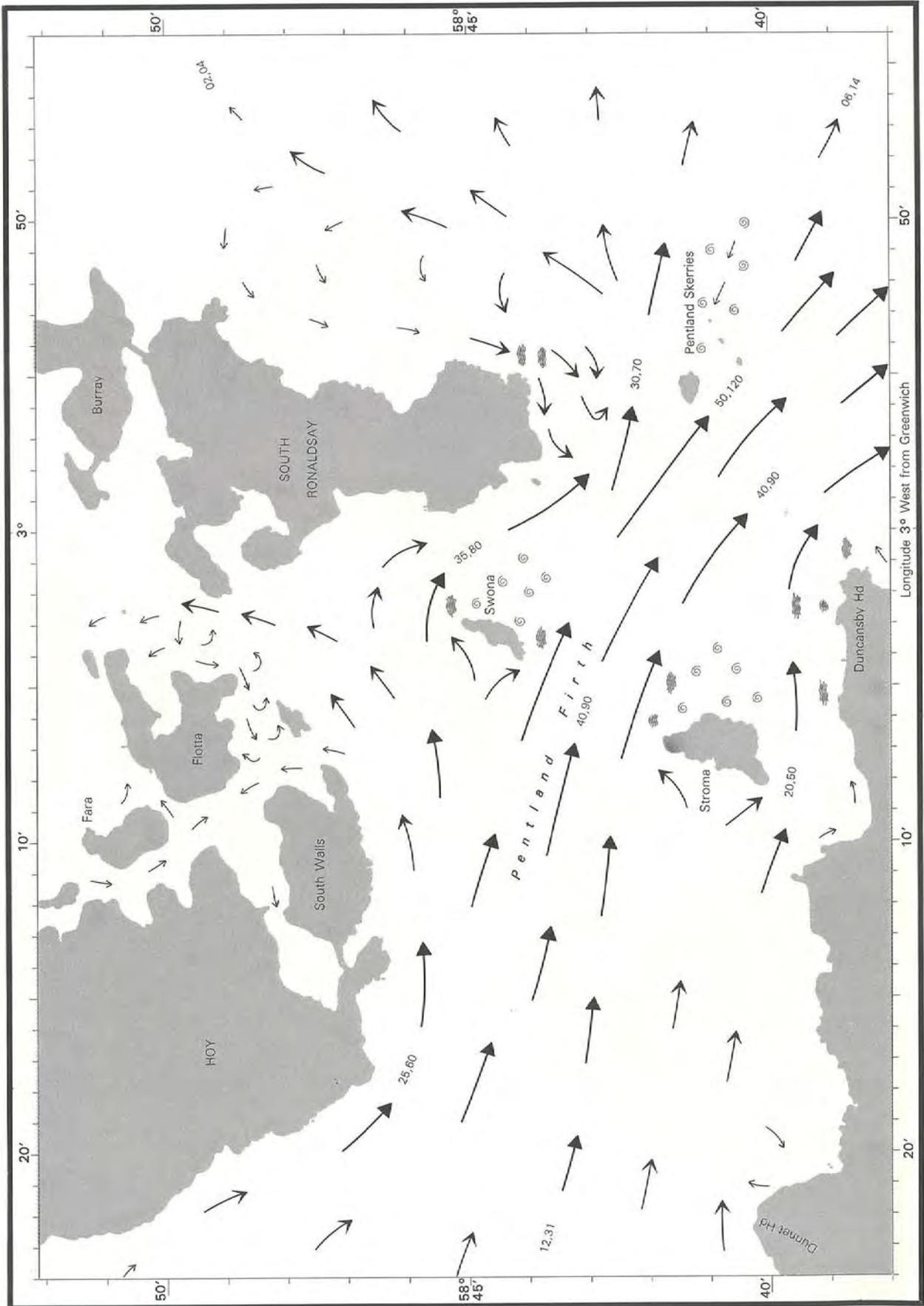
The tanker sailed from Scapa Flow on 11 November with a draught of 14.2m even keel, which gave a freeboard of about 6.6m.

3

BEFORE
HW DOVER

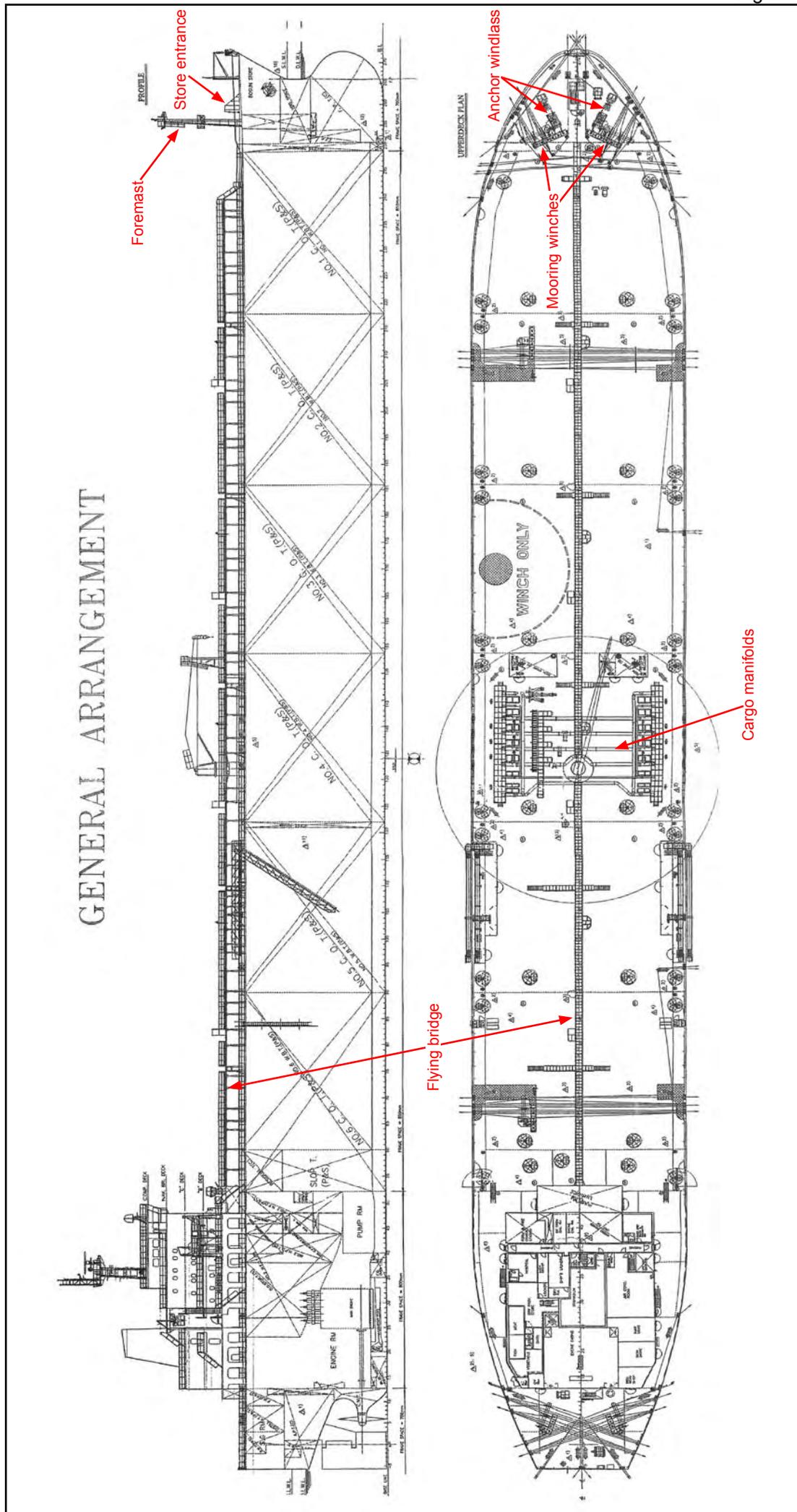
5h 20m before HW ABERDEEN

CAUTION:— Due to the very strong rates of the tidal streams in some of the areas covered by this Atlas, many eddies may occur. Where possible some indication of these eddies has been included. In many areas there is either insufficient information or the eddies are unstable.



Tidal Streams at time of accident

(Note: Figures against the arrows give the mean neap and spring rates in tenths of a knot. Thus: 25,60 indicates a mean neap rate of 2.5 knots and a mean spring rate of 6.0 knots.)



General arrangement drawing

1.5.2 The crew

There was a complement of 24 persons on board at the time of the accident, all of whom were Indian nationals. The deck department consisted of ten crew members: the master, chief officer, second officer, third officer, deck cadet, bosun, three ABs and one OS.

The chief officer, deck cadet and chief engineer had joined the ship in July 2006, the master in August and the remainder of the crew in October.

The master was 37 years old and had started his cadetship in 1988 with a tanker company, in which he served for 13 years. During this time he had gained his Second Mate's foreign-going certificate of competency in India, and his Chief Mate unlimited (II/2) and Master unlimited (II/2) certificates of competency at South Shields, in the United Kingdom. The latter certificate was gained in 2001, after which he served with two other tanker companies as chief officer. In August 2006, FR8 Shipmanagement employed him with a view to appointing him as one of their masters. Before joining *FR8 Venture*, he had been vetted by the company's management team, which had satisfied itself that he was fully familiar with the company's shipboard SMS. On joining the ship, he spent about 6 weeks as understudy to the outgoing master before taking command, which was his first. During the 4/5 years before the accident, the master had, on several occasions, served as chief officer on tankers which had visited the Flotta marine oil terminal, and had carried out ship-to-ship transfers in Scapa Flow.

The bosun was 52 years old and he had been at sea for 31 years. He had served as AB on various types of foreign-going ships, and had been bosun for the last 4 years.

The OS was 27 years of age and had served as a steward initially on a coastal ship and then on a general cargo ship. However, on joining FR8 Shipmanagement, he decided to change department, and was employed as an OS. He had an ambition to become a deck officer. This was his first trip with the company.

AB Ravindra Shirang Bagal (known as Ravindra on board) was 31 years old.

AB Harjivan Bhikhabhal Kharva (known as Kharva on board) was 39 years old.

The number and certification of the ship's complement complied with the Maritime and Port Authority of Singapore's Minimum Safe Manning Certificate, which had been issued to *FR8 Venture* on 16 February 2006.

1.5.3 Cause of death

Post mortem examinations on the bodies of the two ABs found that:

- AB Ravindra had died from multiple injuries predominantly to his chest; and
- AB Kharva had died from a blunt force neck injury.

There were no traces of alcohol in samples of their blood or urine.

1.6 SAFETY MANAGEMENT SYSTEM

The International Safety Management (ISM) Code requires that a company's safety management system should ensure compliance with mandatory rules and regulations. This is achieved by including in the safety management system instructions and procedures to ensure the safe operation of ships and protection of the environment in compliance with relevant Flag State legislation.

FR8 Venture's SMS contained a Ship Operating Manual, a section of which was devoted to *Navigation in Heavy Weather*. In summary, the master was instructed to regulate the ship's speed to prevent damage, warn all departments of impending bad weather, check that loose equipment was secured, warn crew on deck access, rig safety lines where necessary and monitor weather reports.

1.7 WAVE HEIGHT

Most waves at sea are created by the wind, and their height depends on how long the wind has been blowing, the fetch, the currents and the wind strength. Swell is the wave motion which persists after a disturbance has passed to another area. Variations in wave height can occur, and it is not abnormal for a particular wave to be up to twice the significant wave height.

1.8 MEDICAL ADVICE AND ASSISTANCE

The MCA is required to provide Radio Medical Advice (RMA) for ships at sea. Requests from masters and skippers of vessels requiring medical advice or medical assistance are dealt with by HM Coastguard, who will arrange a radio telephone link that will allow the master/skipper to speak to a doctor. When a request for RMA is received, duty staff at the relevant coastguard co-ordination centre will contact the accident and emergency department of either Aberdeen Royal Infirmary or Portsmouth Queen Alexandra Hospital.

The RNLI has its own medical callout system, in which each lifeboat station has a designated local doctor to call upon to provide the lifeboat crews with advice, and on occasion deploy with the lifeboat if required.

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.

This accident resulted from the crew members concerned being struck by two large waves, which were shipped over the bow. The analysis focuses on determining whether the shipping of such waves should have been expected and, if so, why the crew members were in an area of danger.

2.2 FATIGUE

2.2.1 ILO Convention

Article 5 of *Seafarer's Hours of Work and the Manning of Ships Convention, 1996 (ILO 180)* states the limits on hours of work or rest:

(a) *maximum hours of work shall not exceed:*

- (i) *14 hours in any 24-hour period;*
- (ii) *72 hours in any seven-day period;*

or

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

- (i) *ten hours in any 24-hour period; and*
- (ii) *77 hours in any seven-day period.*

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

2.2.2 Hours of work and rest

The master did not carry out any watchkeeping duties either at sea or in port. Since 8 November, while anchored in Scapa Flow, he was called occasionally outside normal working hours to carry out ship's business. However, he was adequately rested, and there is no evidence to indicate that his performance was adversely affected by fatigue.

The three ABs and the OS were on 6 hours on and 6 hours off watches. AB Kharva and the OS were on the 0600 to 1200 and 1800 to 2400 watches. Having been called at about 0400 on 11 November, they had had a little less than 10 hours rest in the 24 hours before the accident. AB Ravindra and the other AB were on the 0000 to 0600 and 1200 to 1800 watches. They had been on deck since 0000 on 11 November and, therefore, had only 6 hours rest in the 24 hours before the accident.

AB Kharva and the OS, and to a greater extent AB Ravindra and the third AB, had had less than the minimum hours of rest required under the *Seafarer's Hours of Work and the Manning of Ships Convention, 1996* and their performance might, therefore, have been adversely affected by fatigue.

2.3 THE WEATHER

The cause of the strong winds was a deep depression to the north of the accident site. The southern part of the depression generated the strongest winds, which moved towards the Orkney Islands as the depression moved east gradually. This movement caused the winds to slowly increase until the wind speed reached its peak at west north-westerly force 8/9 during the afternoon of 11 November, as predicted in the shipping weather forecast for the area.

The strength of wind had not been a concern to either the master or the pilots during *FR8 Venture*'s departure from Scapa Flow. The pilots had disembarked from ships in worse weather conditions and, indeed, the port had not been closed to arrivals and departures in the prevailing conditions.

The two waves that were shipped on the foredeck of *FR8 Venture* must have been higher than the significant wave height as they went over the starboard winch, which was about 2m high, and swept AB Kharva and AB Ravindra off the platform. With a freeboard of 6.6m, the height of these waves would have been at least 8.6m, which, although higher than the waves experienced up to that point, could not be considered abnormal and should have been expected in the prevailing weather conditions.

2.4 DEPARTURE PLANNING

2.4.1 The need for planning

After the pilots had disembarked, and while the tanker was transiting the deepwater channel, spray had been shipped onto the main deck. Before the accident, the master was not overly concerned about spray affecting the crew working on deck, as it was insufficient to cause distress to them or pose a danger. The master had noted the shipping weather forecast and he was of the opinion that, in view of the predicted weather conditions, the crew should be clear of the foredeck of the ship by the time she had reached a position south of Brims Ness, where he intended the ship to be nearly at full speed.

However, following the pilots' departure at 1136, *FR8 Venture* would have been exposed to the escalating and adverse effect of the prevailing wind, increasing engine speed, and the progressive course alteration into the weather. Furthermore, from about 1210, the ship would have been exposed to the full effect of the prevailing wind and to the risk of encountering large waves such as those shipped at the time of the accident.

The master's assessment of the position, by which the crew needed to be clear of the foredeck of the ship, allowed little margin for error, and should have prompted an effective action plan. The plan needed to ensure the following:

- sufficient ship's speed to counter the effects of adverse leeway and set;
- immediate availability of at least one anchor during the transit of the deepwater routes from Scapa Flow;
- sufficient time in which to secure the ship for sea; and
- adequate precautionary measures to counter identified risks to crew safety.

2.4.2 Ship's speed

Orkney Harbour's *Recommendations on navigation for vessels bound to or from Scapa Flow* informed ship's staff that pilots normally disembarked at Nevi Skerry with the purpose of allowing ships to build up to full sea speed, before entering the strong tidal flow in Pentland Firth. This also avoided any difficulty the pilot might have in disembarking to the pilot launch in adverse weather at the pilot station.

This procedure was followed on the day of the accident. After the pilots' departure in Sound of Hoxa at 1136, the engine speed was gradually increased, almost reaching full speed at the time of the accident. This provided *FR8 Venture* with sufficient speed to counter the effects of adverse leeway and set caused by the prevailing wind and tidal stream and so enable her to be navigated safely along the recommended deepwater route.

2.4.3 Anchor availability

It was normal practice for the escort tug to be let go off Nevi Skerry and for the passive tug to standby off Stanger Head. If *FR8 Venture*'s engine had failed while transiting the confined waters of the deepwater route, the strong wind and tidal stream would have had the potential to cause the ship to ground very quickly. In such circumstances, the master's only means of preventing the ship grounding would be to let go one or both anchors.

The Orkney Harbour pilotage plan stated that anchor equipment should be manned and ready for immediate use while a vessel was proceeding in the pilotage area. Although the pilots disembarked off Nevi Skerry, the limit of Orkney Harbour Authority and the pilotage area was at the end of the deepwater route and through which *FR8 Venture* passed at 1215. The port anchor was secured at approximately 1130 and before the pilots disembarked; however, the starboard anchor was left ready for immediate use throughout the recommended deepwater route transit.

2.4.4 Securing for sea

It took about 1 hour and 20 minutes for the ship to proceed from her anchorage in Scapa Flow to the end of the recommended deepwater route. There was limited time available in which to secure the starboard anchor before the ship reached a position at which the master considered that the crew should be clear of the foredeck. Therefore, the departure plan should have ensured that sufficient time was available in which to secure the ship, or at least the foredeck before reaching the end of the deepwater route.

The master was of the opinion that it took about 3 hours to secure the ship for sea and, if the crew were concentrated forward, the foredeck could be secured in 1½ hours. However, he gave no instruction in this respect and was unsure whether or not the crew were intending to take a break during the process. No formal pre-departure briefing took place between the master, the deck officers and the bosun. Therefore, the chief officer's decision to send the OS and AB Ravindra forward was founded on his own perception of the need to speed up the securing operation in view of the ship's progress.

As it normally took 3 hours to secure the ship for sea, the process should have been started before the ship left the anchorage. There was no commercial pressure on the master to sail at the earliest opportunity, and he should have delayed sailing so that the ship could have been secured for sea (other than her anchors) in sheltered waters. The plan could have concentrated the crew forward earlier, leaving the stowing of the after ropes until the forepart of the tanker had been secured.

2.4.5 Precautionary measures

There was limited time available in which to secure the starboard anchor, and little margin of error in the master's estimation of the position by which the crew should be clear of the foredeck. Therefore, the plan should have prompted the need for precautionary measures to be taken, such as considering the option of turning the ship away from the weather, when safe and practicable to do so, to secure the anchors.

2.5 SIMILAR ACCIDENTS

2.5.1 Case 1

The following is a summary of an Australian Transport Safety Bureau report on an accident on board *Aotearoa Chief* on 14 August 2004:

The medium sized container ship disembarked a pilot when the wind was between 35 and 40 knots with a significant wave height of 4.7m. Because of the sea conditions, the master gave orders that no crewmember should go on deck to secure the ship until he had given permission to do so. The master turned the ship so that the ship was steady with no undue pitch or roll. He then told the bosun to take some of the crew with him to stow the pilot ladder and to secure the anchors. After they had stowed the pilot ladder away, the bosun and two seamen went forward. The bosun went behind the port windlass and the two seamen went to the forward side of the starboard windlass. At this time the ship pitched into the trough of a large wave and a solid wave was shipped over the forecandle head. One seaman was swept over the windlass and mooring equipment and was found unconscious. The other seaman was swept to the starboard side to the top of the access ladder and received severe lacerations. The bosun was protected by the windlass and remained uninjured. The ship turned round to return to the port. When paramedics went on board from the pilot launch, they found that the first seaman had died.

2.5.2 Case 2

The following is a summary of an accident which was investigated by the MAIB in the 1990s:

A large container ship left Japan to head west. The ship's speed was decreased to allow a typhoon to pass ahead, however, the ship did encounter high seas. Bilge alarms sounded in the forward spaces, and the chief officer and the bosun were sent forward along an under-deck passageway to investigate. They found the deck vents to the bow thruster room were open, and they closed them. They returned to the forecandle storeroom, where they saw the hatch to the forecandle head was leaking water. The bosun volunteered to go up on deck and to tighten the hatch down. As he was carrying out this task, the ship shipped two large waves over the bow. The ship was turned round in the belief that the bosun had been swept overboard. However, he was found wedged under the windlass and later died of his injuries.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE NOT RESULTED IN RECOMMENDATIONS BUT HAVE BEEN ADDRESSED

1. The two large waves that were shipped over the bow could not have been considered abnormal and should have been expected in the prevailing weather conditions. [2.3]
2. The master should have delayed the sailing so that the ship could have been secured for sea in sheltered waters. [2.4.4]
3. Having decided to leave the shelter of Scapa Flow before the decks were secured for sea, the master's assessment of the position by which the crew needed to be clear of the foredeck of the ship allowed little margin for error. This should have prompted an effective plan of action. [2.4.1]
4. The plan could have concentrated the crew forward earlier, leaving the stowing of the after ropes until the fore part of the vessel had been secured. [2.4.4]
5. The plan should have prompted the need for precautionary measures, such as considering the option of turning the ship away from the weather, when safe and practicable to do so, to secure the anchor. [2.4.5]

SECTION 4 - ACTION TAKEN

4.1 FR8 SHIPMANAGEMENT

The managers have reviewed and amended their company SMS procedures for working on deck in heavy weather. Relevant extracts are as follows:

- *The priority, which Master and Deck Officers should have is to ensure that when the vessel is either arriving or leaving port, the unsecuring or securing should be done as later or early as possible (basis whether vessel is arriving port or departing port) to ensure that crew are on deck and exposed to the elements for the least possible time.*
- *When departing port, most of the securing should be done prior leaving the berth or anchorage.*
- *When vessel has left the berth or anchorage, the guiding principle should be to secure the vessel from forward to aft.*
- *It would be prudent to concentrate the manpower in one locale, rather than spreading them out and trying to secure all over as a concentrated effort will mean a quicker securing [sic].*

4.2 MARITIME AND COASTGUARD AGENCY

The MCA has issued a Safety Alert, which gives a brief outline of the accident and draws attention to the contents of Chapter 3 of the Admiralty Sailing Directions North Coast of Scotland Pilot. This warns mariners of strong tides, with large waves that frequently occur in the area of Pentland Firth (**see Annex A**).

SECTION 5 - RECOMMENDATIONS

Due to the actions already taken as a result of this accident, the MAIB has issued no safety recommendations.

**Marine Accident Investigation Branch
July 2007**

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

MCA's Safety Alert *Two Deckhands Killed in Pentland Firth*

Two Deckhands Killed in Pentland Firth

1. On 11 November 2006, a laden tanker of 74,000 tonnes deadweight was proceeding out of Scapa Flow into the Pentland Firth, heading for the United States East Coast after having completed a ship to ship cargo transfer.
2. The tanker was approximately 3–4 miles west of the island of Swona in the Pentland Firth and four crew members were on the forecastle head securing the anchors, when it was hit by a number of abnormal waves in succession.
3. Three of the crew were carried aft along the maindeck by the force of the first wave. Two men received injuries which proved fatal. The third is now recovering from spinal and head injuries in hospital.
4. The weather conditions forecast at the time of this incident were westerly gales of 40 to 50 knots and heavy seas. The tide was also flooding from the west.
5. Ship Masters and Deck Officers on vessels transiting the Pentland Firth should be aware of the information given in the Admiralty Sailing Directions North Coast of Scotland Pilot (NP 52) chapter 3, in particular section 3.110 which describes the Merry Men of Mey forming off St John's Point and extending the whole way across the firth to Tor Ness. "The most violent part...lies over a large sandwave field 3.5 miles west of Stroma. With a west sea or swell the entire race becomes very violent; large waves form suddenly and from varying directions, making them difficult to anticipate or counter."
6. Masters must take the above into serious consideration so as not to jeopardise the safety of their crew when transiting the Pentland Firth. Further advice may be sought from Aberdeen or Shetland Coastguard Rescue Centres if required.