

Report on the
abandonment and subsequent sinking
of the Motor Vessel

IRVING FOREST

in the North Atlantic Ocean
in January 1990

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The accident was investigated by an Inspector appointed by the Government of Bermuda. This report, based on his inquiries, has been produced by the United Kingdom Marine Accident Investigation Branch on behalf of the Bermudian Authorities.

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1. INTRODUCTION

IRVING FOREST a Bermudian Registered 8,100 tonne deadweight ship left St John, Canada, on 6 January 1990 with 18 crew and one supernumerary (wife of crew member) on board, carrying a cargo of wood pulp and newsprint. Her first port of call was scheduled to be Rouen, France with an estimated date of arrival of 14 January.

Late on the 10th, in mid-North Atlantic, during storm weather conditions of 65 knot winds (Beaufort force 12) and 6-9 metre seas, the ship took a starboard list of some 20 degrees, as a result of ingress of water into the starboard side ballast tanks.

Early on the 11th as a result of the heavy list and the prevailing conditions the ship suffered a total blackout which resulted in loss of propulsion. A deck stowed container was lost overboard and subsequently three other deck stowed containers were also lost.

By noon on the 11th the ship, in mid-North Atlantic without any power, was listing 30-35° to starboard. The Master sent out a distress call at 1210 hours (1310 GMT) and as a result contact was made with BT NESTOR a tanker of 69,900 tonnes deadweight which was some 3 hours steaming time away from IRVING FOREST.

Everyone was then mustered on the port side of the boat deck in their survival suits and the Master's plan was to abandon IRVING FOREST on the arrival of BT NESTOR which was estimated as 1615 hours local time.

During the preparations to abandon ship using the 20 man inflatable liferaft stowed on the boat deck - portside - the 2nd Engineer's wife (the supernumerary), the Chief Officer and a GP seaman were washed overboard. Fortunately an RAF Nimrod aircraft had arrived over the ship at this crucial time and they dropped an air-sea rescue pack including two inflatable liferafts, one of which the three persons in the sea eventually boarded.

The remaining members of the crew subsequently left the ship by jumping overboard while hooked onto the ship's liferaft painter, the liferaft having been successfully launched into the sea.

All IRVING FOREST's crew, including the supernumerary, were embarked aboard BT NESTOR by 1900 hours local time.

As a result of the condition of the ship exacerbated by the weather conditions, communications from and to IRVING FOREST proved difficult throughout the emergency. However using the various equipment carried by the ship successful transmissions were made and received at the critical times.

There was no loss of life as a result of this accident. IRVING FOREST subsequently sank.

2. VESSEL DETAILS

2.1 IRVING FOREST was built in 1973 as a two-deck general cargo vessel with special design features for the carriage of forest products and/or containers. These features included double skinned holds and strengthened tank tops. Folding steel hatches were fitted on both decks. Cargo handling was by four electric cranes. The vessel was built to Finnish Ice Class 1A and classed by Det Norske Veritas. Propulsion was by a Burmeister and Wain engine type 6K 62EF developing 8300 BHP, giving a speed of 16 knots through a single controllable pitch propeller.

2.2 Principal Details:

Gross Tonnage	:	6,616.47
Net Tonnage	:	2,956
Summer Dwt	:	8,123 tonnes : Draught 8.045 metres
Winter Dwt	:	7,810 tonnes : Draught 7.897 metres
Length Overall	:	129.38 metres
Breadth Moulded	:	19.40 metres
Depth to Upper Deck	:	10.30 metres
Call Sign	:	VSBG8
Official No.	:	702194
Port of Registry	:	Hamilton, Bermuda

The vessel was acquired by a Bermudan Company in 1983, and was managed by Kent Line Ltd, of St John, New Brunswick, Canada.

2.3 The vessel was fitted with a comprehensive range of modern navigational and radio equipment.

2.4 All required Statutory Certificates were in force at the time of the accident.

2.5 On her last voyage, the vessel carried a crew of 18, including the Master, plus one supernumerary, the 2nd Engineer's wife. The manning complied with the scale laid down in the Safe Manning Certificate (issued 4 May 1984). The Master, Chief Officer, Radio Officer, Chief and Second Engineer Officers and the supernumerary were British, the 3rd Engineer Canadian, and the rest of the crew were Filipino nationals.

2.6 **Ballast Arrangements**

The vessel had a maximum water ballast capacity of 2,520 tonnes, the ballast tanks being the fore and after peaks; fore deep; No 1 double bottom and No 2 double bottoms (port and starboard). Additionally, the vessel was fitted with side ballast tanks, four each side in way of the holds, each tank being 2.0 metres wide, formed by the "double skin" design of the holds. Ballast pumping systems were remotely controlled from a mimic board located in the Ship's Office on the starboard side of the 1st poop deck, with a small board for pipe tunnel bilge suctions located alongside bilge pump 1 in the Engine Room. The butterfly valves to the various tanks and bilges were remotely operated by compressed air at 2.5 bar; each tank was fitted with separate suction and filling valves together with a crossover valve. Pump sea suction and overside discharge valves (manually operated) were located in the Engine Room. Tank contents were monitored by pneumacator gauges. The electrically driven ballast pump and bilge pump 1 had capacities of 240 cu.m/hr and 85 cu.m/hr respectively. Filling/discharge lines were led to the side ballast tanks via pipe tunnels located below the tanks each side. The No 4 pipe tunnel was entered from the Engine Room via a bolted manhole cover, the entrance to No 2/3 pipe tunnel being a similar cover at the fore end of No 4 pipe tunnel. Both tunnels were fitted with bilge suctions and alarms.

3. CONDITION OF VESSEL PRIOR TO SAILING

3.1 Surveys, Tests and Repairs

Purchased from Finnish owners in 1983, mv IRVING FOREST had been employed on the North Atlantic wood products trade for several years. The vessel was classed by Det Norske Veritas, who also issued the Statutory Safety Certificates. Both Special Hull Survey and Continuous Machinery Surveys were completed in May 1988. Following a collision in June 1988, the vessel was dry-docked in the Netherlands and major repairs carried out to the port bow, No 1 double bottom (DB) tank top and bottom plating. In association with this work, repairs were made to the ballast and bilge control systems. All lines were pressure tested by specialists, and seven ballast valves overhauled: No 3 port side tank suction and filling valves, which had leaked under test, and five others in the fore peak, deep and No 1 DB tanks. The six bilge suction valves in holds 1, 2 and 3 were also overhauled. A short section of ballast filling line in the Engine Room was renewed.

3.2 Stowage of Cargo

3.2.1 IRVING FOREST had loaded wood pulp and newsprint at St John NB on a regular basis since coming on to the trade in 1983, so the stevedores were familiar with the ship and cargo. The cargo loading plan and stability calculations were prepared ashore and verified by the Chief Officer. Both Master and Chief Officer were well experienced in the carriage of wood products.

3.2.2 The bales of wood pulp were machine stowed at the ends of the holds and the centre spaces were filled using a multi-lift spreader. Any gaps were filled using single bale units. Each bale was wire strapped. The rolls of newsprint were also machine stowed to the height of the tween deck and any gaps were filled using air bags. Tween deck hatches were closed in Nos 1, 2 and 3. In No 4 hold, three tiers of wood pulp were stowed on top of 260 tonnes of Brazilian pulp previously loaded at Newark. No 4 tween deck hatches were left open, and an additional three tiers of pulp, on 2" x 4" wood dunnage laid on top of the lower hold cargo, were continued up into the tween deck space.

3.2.3 The deck cargo consisted of 22 x 40ft containers each holding 23-27 tonnes of newsprint. Each container was sitting on cones, secured to the hatch by four chains. Bridging pieces were inserted between the containers, which were stowed 4 abreast on No 1 hatch and 6 abreast on each of the three other hatches.

3.3 Securing of Hatches, Superstructure Openings, etc.

Prior to loading, all hatch seals were checked and about 3 metres of rubber sealing renewed. All packing was coated with silicon sealer before closing the hatches, and sealer was run over hatch lid adjacent edges. The hatch lids were secured by cleats, and hatch ends were taped. Before leaving St John all access doors were sealed with silicon and battened down, with the exception of one door and the mooring rope access plates which were secured after sailing. The fore peak tank manhole cover was bolted down, anchor cables secured on deck and in the chain locker. The spurling pipes were bagged and cemented. The chain locker doors were battened down and all hold ventilators closed. It was stated that there were 9 or 10 defective air pipes around the vessel, marked up for repair, although no air pipe had given trouble on previous voyages.

4. NARRATIVE

- 4.1 IRVING FOREST sailed from St John NB in the early hours of 6 January 1990, bound for Rouen in France. Her ETA Rouen was 1900 hours on 14 January.
- 4.2 At the time of sailing, the vessel had a displacement of 11,623 tonnes including 190 tonnes of water ballast in No 1 DB tank, and 370 tonnes in No 2 DB, both tanks being full. All other ballast tanks were stated to be empty, with the exception of No 4 port side ballast tank. Both the Master and the Chief Officer thought that there was some water in this tank, possibly 20-30 tonnes. The vessel's mean draught was 7.563 metres, metacentric height 0.47 metres.
- 4.3 The voyage proceeded normally, the vessel passing south of Sable Island, from where a rhumb line course of 081° T was set to pass south of the Scilly Isles. This course was maintained until the early hours of 11 January. The vessel was making an average speed of 13.0 knots. The vessel participated in the US AMVER scheme and was a Canadian weather ship, sending reports every six hours.
- 4.4 It was stated that tank soundings were taken every morning by the 4-8 deck watch. Records were lost with the ship, but the Chief Officer recalls that the side ballast tanks and the fore and after peak tanks were sounded on 7 January, showing negligible amounts. Ballast tank contents were normally monitored on the Control Room gauges. These pneumacator gauges had proved reliable in the past, and were last serviced by the manufacturer's representative in October-November 1989. Pipe tunnels were sounded on 9 January showing 7-8 cms in one of them. On previous voyages all pipe tunnels had been found to have water in them from time to time. A significant amount had been pumped out of No 4 starboard pipe tunnel on the passage from Newark to St John. The sounding on that occasion was 2ft (60cms). The bilge alarm was not checked.
- 4.5 On IRVING FOREST the ballast and bilge pumping systems were the responsibility of the deck department, including the operation of the ballast and bilge pumps in the Engine Room. Filling and emptying tanks, etc, was usually carried out by the Chief Officer. His normal practice was to adjust a small list by using the side ballast tanks. The narrow width of these tanks (2.0 metres) minimised free surface effects.

- 4.6 On the morning of 10 January the Chief Officer decided to fill the after peak tank to counteract the change of trim produced by the consumption of fuel from No 4 DB tank. After about 20 tonnes had been pumped into the after peak, he noticed that water was also going into No 2 starboard side tank. He cycled the switch operating No 2 starboard side tank filling valve, but there was no indication as to whether the valve was open or closed. (When operating correctly, the mimic board showed a green light when a valve was open, and no light when a valve was closed.) Pumping to the after peak was stopped, and No 2 starboard side tank pumped out using the suction valve with the crossover valve closed, (see Section 2.6). No 2 starboard side tank was successfully discharged, and, at 0930 hours all remote controlled valves were closed. The after peak filling valve (manual) was left open with the intention of completing the filling of the after peak later.
- 4.7 At 1245 hours on 10 January a small port list developed and the Chief Officer decided to correct this by pumping 20 tonnes into No 4 starboard side tank. He found, however, that the ballast was going into No 2 starboard side tank, so he continued pumping until 20 tonnes had gone into this tank. There was no indication that any water had gone into No 2 starboard side tank between 0930 hours and 1245 hours.
- 4.8 From the above, the Master and Chief Officer concluded that No 2 starboard side tank filling valve was stuck open. This valve was located in No 2/3 starboard pipe tunnel below the tank, (see Section 2.6). As the weather was deteriorating, and the vessel would be in port in 4 days, it was decided not to enter the pipe tunnel and tap the valve actuator, a procedure which had worked with stuck valves in the past.
- 4.9 During the night of 10-11 January, a deep, fast moving depression passed to the north of IRVING FOREST, moving ENE. During this period the wind veered from SW to NW, reaching force 10-11 with gusts up to 80 knots. The sea state was rough or very rough, wave height 4 metres swell SW'ly, height 4 metres.
- 4.10 The vessel remained upright until about 2200 hours on 10 January, when the 3rd Officer noticed a small starboard list developing. By 2330 hours he estimated that the list had reached 20° and he informed the Master. The Master went to Ship's Office/Control Room, joining the Chief Officer who had been awakened by the heavy list. They found that the gauges were indicating 50-70 tonnes in No 2 starboard side tank. This was pumped out, bringing the vessel almost upright. The Master and Chief Officer then watched the tank level gauges for about 10 minutes, and could detect no ingress of water.

About this time the Master visited the Engine Room and checked that the remotely operated suction and discharge valves to the ballast pump and No 4 starboard side tank were closed. At about midnight the vessel's course was altered to 100°T to bring the wind, now force 8-9, nearly astern and reduce the heavy combined yawing and rolling.

- 4.11 After a short interval, the vessel began listing to starboard again, and from 0130 hours on 11 January the Master spent most of his time in the Control Room pumping out Nos 2 and 4 starboard side tanks. At about this time an attempt was made to level No 2 port and starboard tanks, without success due to the list. The discharge rate did not seem to be at the pump's normal capacity (ie both suction and filling valves were open). Ingress of water appeared to be about 30 tonnes per hour. As soon as the ballast pump was stopped, No 2 starboard side tank began filling again, and, at a slower rate, No 4 starboard side tank.
- 4.12 In an attempt to reach and close No 2 starboard side tank filling valve, the Chief Officer removed the bolted on access plate to No 4 starboard pipe tunnel, situated in the Engine Room. On removal, water flowed over the 60cms high sill. Attempts to pump out the pipe tunnel using the tunnel bilge suction were unsuccessful, so the water was pumped into the Engine Room bilge using a portable pump and thence overboard via the bilge pump. When the water was reduced, it was found that the bilge suction strainer in No 4 starboard pipe tunnel was clogged with pipe lagging. The Chief Officer was able to get into the tunnel at about 0530 hours. He found water gushing in from a hole in the old side ballast steam heating coils. These coils had been in the ship since new, but had been blanked off in the Engine Room in 1983, and not used since. On removing a few nuts from the access plate to No 2/3 starboard pipe tunnel, (at the fore end of No 4 tunnel) he found water entering at a considerable rate. The bilge pump was switched to No 2/3 tunnel bilge suction, and the Chief Officer left the tunnel, intending to return later when the water level in No 2/3 tunnel had been reduced.
- 4.13 From 2300 hours on 10 January the heavy list combined with the yawing and rolling due to the storm began causing problems in the Engine Room. The fuel oil pump lost suction on the starboard DB tank and had to be switched to the port DB tank.

The main engine cylinder lubricator floats began sticking to the sides of the lubricator boxes, starving the cylinders of oil. This was rectified by depressing the floats by hand, a job which had to continue throughout the night.

- 4.14 At about 0710 hours on 11 January a container was lost overboard from No 3 hatch, and the Master decided to heave the ship to. The ship was brought round with difficulty to a heading of 270°T with the wind 45° on the starboard bow, still blowing at gale force. Just before this manoeuvre, the 2nd Engineer noted that the Engine Control Room clinometer was swinging between 5° and 45° to starboard, giving the list at that time as approximately 20°.
- 4.15 The turn into the wind caused problems with the turbocharger and the variable pitch propeller, which were rectified. Due to the low revolutions on the main engine, it became necessary to change over from the shaft generator to the starboard diesel driven generator.
- 4.16 At about 0825 hours the starboard generator stopped and the port generator failed to start on automatic. The emergency generator was on manual start due to switchboard faults, but it was found impossible to start due to low batteries, which in turn was due to a faulty battery charger.
- 4.17 From 0825 hours on 11 January the vessel lay stopped and without power, beam on to the sea and wind, heading approximately 235° T. The Meteorological Office assessment of the weather in the vicinity at the time was storm force 10-11 gusting to 80 knots; sea state rough or very rough, wave height 4-6 metres; swell WNW heavy, about 4 metres.
- 4.18 The ballast pump had been pumping Nos 2 and 4 starboard side tanks up to the loss of power at 0825 hours. The Chief Officer immediately went to the Control Room and shut the suction and delivery valves to these tanks. He could not confirm that the valves were completely closed because there were no lights showing on the mimic board. He also went to the Engine Room and shut down the suction to No 2/3 starboard pipe tunnel, and the bilge pump suction and discharge valves. He did not check any other valves at this time.
- 4.19 During the morning of 11 January two more containers were lost overboard, one each from the starboard sides of No 2 and No 4 hatches. With the vessel listed toward the heavy seas, the main deck was continuously awash. Pumping stopped with the loss of power and the list continued to increase until it was about 35° to starboard by noon on 11 January.
- 4.20 At about that time the Master decided that the ship would not last the night and must be abandoned. At 1210 hours the Radio Officer sent out a Distress Call on 500kcs, using the emergency transmitter on emergency power. This call was received by Valencia Radio and St John's Newfoundland, and relayed to Falmouth Coastguard. The emergency receiver broke down, and the lifeboat radio transceiver was plugged into the aerial.

An Indian vessel, mv KABIRDAD was contacted and gave an ETA of 2300 hours local time. IRVING FOREST's position at this time was given as 46°53' North; 28°20' West.

- 4.21 At about 1300 hours, electrical power was restored by rigging a jury fuel supply to the port generator, and the main engine was re-started. The Radio Officer made contact on VHF radio with the British tanker BT NESTOR, 69,900 tonnes dwt, which gave an ETA of 1615 hours. The Master decided to await the arrival of BT NESTOR before abandoning ship.
- 4.22 The 2nd Engineer had injured his back whilst working on the port generator, and was brought up to the boat deck on a stretcher, where all the crew were assembling wearing survival suits in preparation for abandoning ship. Prayers were said. Due to the heavy list, the lifeboats were unusable, and it was found impossible to launch the starboard inflatable liferaft. The port inflatable liferaft was launched with difficulty and brought round to the starboard quarter for boarding. In the meantime, the Chief Officer and the 2nd Engineer's wife were swept overboard. By great good fortune, an RAF Nimrod aircraft arrived on scene at this moment, and was able to drop a Lindholme Air Sea Rescue apparatus and two liferafts, one of which the Chief Officer and 2nd Engineer's wife were able to reach and hook on to. Shortly after this, one of the seamen went overboard and managed to board this raft and assist the 2nd Engineer's wife, who was exhausted, and the Chief Officer, who had injured his knee, to board the raft also. The raft drifted down towards BT NESTOR, which had just arrived, and the three survivors taken on board.
- 4.23 The remaining crew abandoned IRVING FOREST by clipping on to the liferaft painter and jumping into the sea. Prior to this, the Chief Engineer had returned to the Engine Room and stopped the main engine. The liferaft was safely boarded and despite some minor difficulties with equipment, the survivors were finally on board BT NESTOR by 1900 hours, the tanker having had difficulty manoeuvring to pick them up due to a fourth container which went over the side during the rescue operation. At the time of the abandonment the wind was WNW force 6-7, gusting 40 knots. Visibility good, sea rough - height 3-4 metres. Swell WNW heavy, about 5 metres.
- 4.24 The position of the abandoned IRVING FOREST was given as 46°58'.6 North; 28°26'.8 West. Two days later, on 13 January, signals were picked up from the vessel's EPIRB, giving a position of 47°04' North; 28°05' West.
- 4.25 A tug was despatched from Falmouth, arriving in the area on the third day after the abandonment, but nothing was found. Subsequent passes of a satellite failed to show any trace of IRVING FOREST, and on 31 January the vessel was declared a Constructive Total Loss.

5. DISCUSSION

5.1 Condition of vessel on sailing

- 5.1.1 The hull and machinery of this 18 year old vessel were stated to be in generally good condition. All class and statutory surveys had been carried out, and satisfactory repairs to collision and pounding damage in the fore part of the vessel had been made good. However it was known that 9 or 10 air pipes were defective, due to damaged or missing plastic non-return balls. Replacement balls were on board, but had not been fitted due to the difficulty of burning off the ball retaining bars and re-welding them. No 1 starboard side tank air pipe had about two thirds of its ball left, and the ball in No 4 starboard side tank air pipe was also defective.
- 5.1.2 The vessel's control systems were giving cause for concern, particularly switchboard problems, which were serious enough to require a visit by a specialist engineer familiar with the vessel's equipment. As a consequence of these problems, a chain reaction of faults led to the complete loss of power when the vessel heeled on 11 January. Both diesel generators failed to start when the changeover from the shaft generator was made, and the emergency generator could not be started due to low batteries, due in turn to a faulty battery charger.
- 5.1.3 Cargo stowage was good, both stevedores and ship's staff having loaded wood products in this vessel many times. The stow was stated to have been tight, air bags being placed in void spaces, with the exception of one small space in No 1 lower hold. Past experience has shown that whilst baled pulp cargoes do not easily shift, pulp can compact, leaving spaces above it. If this compaction occurred in a vessel with a significant list, it would tend to increase the list. The vessel's stability, with a metacentric height of 0.47 metres, was adequate for the intended voyage. On sailing, the vessel was stated to have been 517 tonnes short of her Winter Load Line Displacement. The vessel was properly prepared for sea by sealing hatches, doors, etc, closing ventilators and securing anchor chains. In particular, it was stated that the door to the fo'c'sle space was secure, and the starboard door from the poop to the main deck was checked by the 3rd Officer about midnight on 10/11 January. The 22 containers on deck were secured by chains and bridging pieces. Four containers were lost overboard on 11 January, but this was probably caused by excessive stress on the lashings due to the heavy rolling superimposed on a list of some 20-35° at the time.

5.2 Ballast and Bilge Operations

- 5.2.1 As detailed in Section 2.6, the vessel could carry water ballast in the fore and after peak tanks, the fore deep tank, and Nos 1 and 2 Double Bottom tanks, but during the period under consideration, 10/11 January, with the exception of 20 tonnes pumped into the after peak, ballast and bilge pumping operations were confined to the starboard side (SS) tanks in way of each of the holds 1-4, formed by the double skin design. In particular, Nos 2 and 4 SS tanks, and the associated starboard pipe (SP) tunnels immediately below them.
- 5.2.2 It was stated that soundings were taken every morning by the 4-8 watch, but that the side tanks were only sounded occasionally to check the pneumacator gauges. The Chief Officer stated that the last time the side tanks were sounded was on 7 January, when only small amounts of water were found. He had inspected No 4 SS tank in November 1989 after a lot of water was found in this tank. The ballast line was pressurised, but no leakage was found. The pipe tunnels were last sounded on 9 January, showing only 7-8cms in one of them. It was stated that on previous voyages, all pipe tunnels had had water in them, with the exception of No 1. On the passage from Newark to St John, a "fair amount" had been pumped out of No 4 SP tunnel. On that occasion the bilge alarm had not operated and was not checked. There were 4 high level bilge alarms in the pipe tunnels, at the after ends of No 2/3 section port and starboard, and No 4 section port and starboard. None of these alarms operated on the night of 10/11 January. The starboard pipe tunnels had last been inspected in May 1989.
- 5.2.3 The pneumacator gauges were stated to be reliable, and had been serviced in October/November 1989. Seven of the remotely operated butterfly valves controlling the ballast operations had been serviced in June 1988, but there is no record of any further maintenance of valves since that date. Butterfly valves have a proven reliability, but have been known to creep open, or closed, and on IRVING FOREST there had been occasions when stuck valves had been freed by tapping the valve actuator.
- 5.2.4 The first indication that No 4 SS tank filling valve was not operating correctly came at about 0930 hours on 10 January when the Chief Officer found water entering this tank as he was pumping into the after peak tank. He cycled the No 2 filling valve switch, but the green light which should have indicated that the valve was open, did not come on. The water in No 2 SS tank was pumped out, and all remotely controlled valves closed.

After a ballast or bilge operation it was routine not to close the manual ballast suction valve in the sea chest in the Engine Room, the overboard discharge/flooding valve or the bilge pump overboard valve. The reasons given were that this would have defeated the remote control system, and that it was not necessary to close ship side valves manually when there was a two valve isolation between tank and sea. Additionally, the Master had been told that these manual valves could not be closed because they were required to be open for main engine cooling purposes. This was not so, as the two main SW cooling pumps each had its own sea valve.

- 5.2.5 Between 2200 hours and 2330 hours on 10 January the vessel developed a serious list, estimated at about 20° to starboard. The Master and Chief Officer found that there was 50-70 tonnes of water in No 2 SS tank and the Master stated that there was 20 tonnes in No 4 SS tank. These tanks were pumped out, bringing the vessel upright, and initially, it appeared that no more water was getting into the tanks. The Master went to the Engine Room and checked that the remotely controlled suction and discharge valves on the ballast pump, and the valves for No 3 SS tank (located in the Engine Room) were closed.
- 5.2.6 After a short interval, water again began filling No 2 SS tank, and, at a slower rate, No 4. The Master estimated the rate of ingress at 30 tonnes per hour and stated that the ballast filling line appeared to be under pressure. It is possible that two suction/discharge valves on the ballast pump were leaking from the sea, in addition to the No 2 SS filling valve. The Master also stated that the ballast pump did not seem to be operating at its normal rate. This could indicate that due to a combination of open and leaking valves, the pump was partially re-circulating ballast water back into the tanks. At this stage the problem was still considered to be controllable if No 2 SS tank filling valve could be closed. The Chief Officer's attempt to enter the starboard pipe tunnel and close the valve by tapping the actuator, proved abortive, and revealed the further problems of water in No 4 SP tunnel (estimated at about 23 tonnes) and a large amount of water in No 2/3 SP tunnel, indicated by a head of pressure when the access plate between Nos 2/3 and No 4 tunnels was slackened. The Chief Officer discovered water entering No 4 tunnel through a hole in an old No 4 SS tank steam heating pipe. The bilge pump was put on to No 2/3 SP tunnel suction, and the access plate to No 4 tunnel was left off, with the intention of making a further attempt to close the No 2 filling valve when the water level had been reduced.

- 5.2.7 Pumping continued throughout the early morning without reducing the list, estimated to be still about 20° when the vessel was hove to at about 0710 hours. With the vessel listed and rolling heavily in very rough seas the starboard side of the main deck was continuously awash, most probably allowing water to enter the starboard side tanks through the defective air pipes.
- 5.2.8 It is at this stage that those on board should have realised that the situation was getting out of control, and that alternative methods of dealing with it were needed. One possibility was setting up the various valves in a way which would have cancelled or reduced the circulatory effect which was reducing the efficiency of the ballast pump. This might have worked, but would have depended upon correct identification of those valves thought to be leaking.
- 5.2.9 The other possibility was to pump ballast into the port side tanks sufficient to bring the vessel upright, then close all ship side valves and proceed by a process of elimination to identify and rectify the problems in the starboard side tanks and pipe tunnels. The vessel was 517 tonnes below her Winter Displacement, so the additional weight in the port tanks would have been acceptable on a temporary basis. It is noteworthy that the list appears to have remained at about 35° from about midday until after the vessel was abandoned. Just before leaving the vessel, the Chief Officer checked the starboard side tank gauges, and found No 1 full; No 2 about half full; No 3 had 30-40 tonnes; and No 4 was approximately full.

5.3 The Abandonment

- 5.3.1 The initial distress call at 1210 hours and subsequent communications were accomplished admirably by the Radio Officer in spite of a number of difficulties ie initially, emergency power only; breakdown of the emergency receiver; and loss of the main transmitter. The distress calls were received ashore on both sides of the Atlantic and relayed to Falmouth Coastguard. An RAF Nimrod aircraft was despatched to the scene, and two vessels in the vicinity answered the distress. The nearest, the tanker BT NESTOR, arrived at about 1630 hours, as did the Nimrod. The arrival of the aircraft and the accuracy of its liferaft drop was crucial in saving the lives of the 2nd Engineer's wife, the Chief Officer and a seaman who had all been swept overboard prior to the organised abandonment. The skilful handling of the large tanker BT NESTOR in the prevailing severe conditions with the added hazard of a floating container to contend with was a major factor in saving the lives of all concerned.

5.3.2 IRVING FOREST was equipped with survival suits for all on board (in excess of statutory requirements) and these suits proved to be a major factor in preserving the crew's lives. Each suit had a safety line which was hooked to the liferaft painter as each crew member jumped overboard. The survivors were in the liferafts for some 1½-2 hours as BT NESTOR manoeuvred to pick them up. The sea temperature was 11°C at the time, but the suits kept them warm. It was dark before they were finally taken on board BT NESTOR, and it was reported that whilst the lights on the rafts dropped by the Nimrod were bright, the light on IRVING FOREST's raft was poor.

5.3.3 No lives were lost, but minor injuries were sustained by five of the survivors.

5.4 Subsequent Events

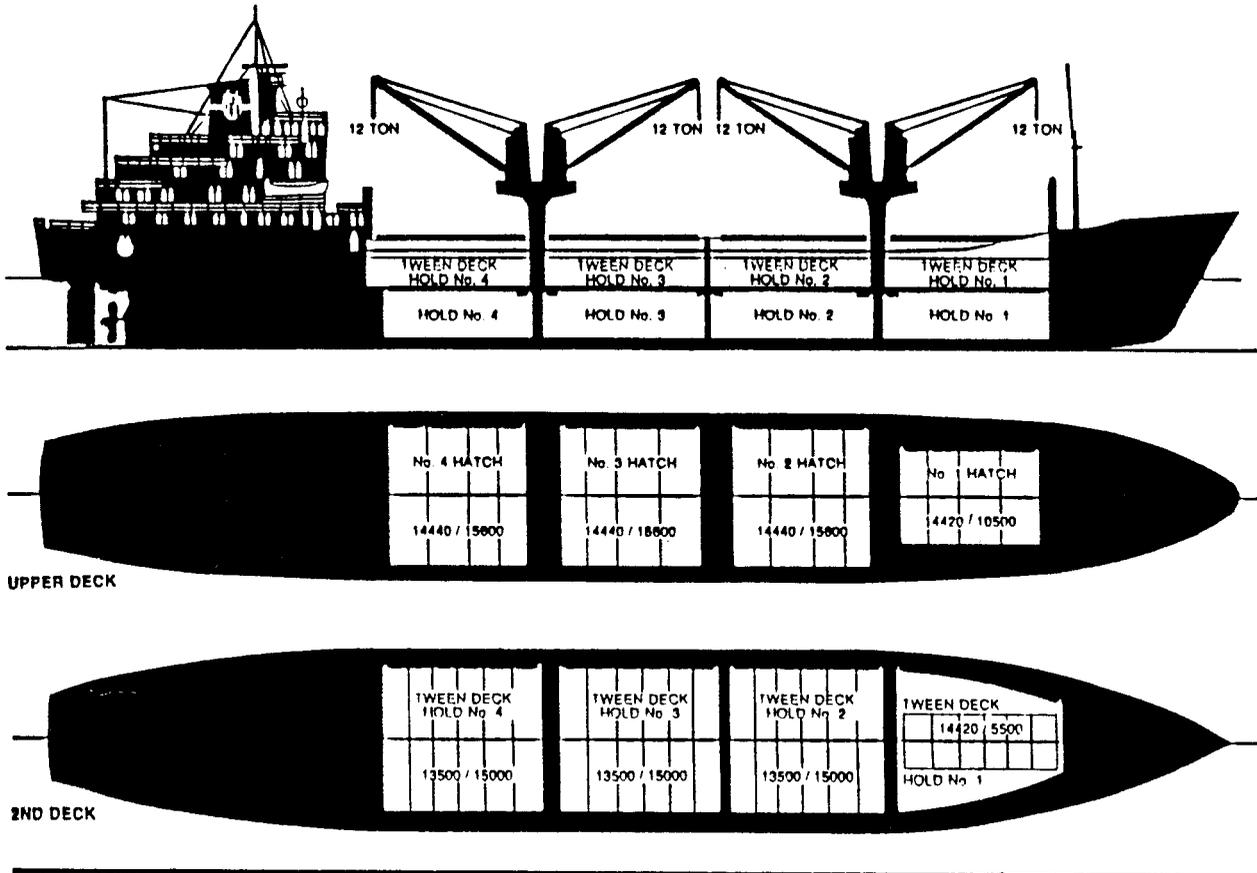
5.4.1 A signal from the vessel's float-free EPIRB was picked up about 46 hours after the abandonment, giving a position of 47°04' North; 28°05' West, this probably indicates the time and position when IRVING FOREST sank. Photographs of the abandoned vessel taken from the Nimrod clearly show the door on the starboard side of the poop leading on to the main deck to be open. The steady ingress of water into the Engine Room from the starboard pipe tunnel, together with a possible cargo shift, would eventually submerge this door, leading to rapid flooding of the Engine Room.

6. FINDINGS

- 6.1 The vessel was properly manned and well equipped. Safety equipment carried was in excess of that required, and this contributed to the survival of the ship's entire complement. The cargo was properly stowed.
- 6.2 The vessel was also generally well maintained. However, it was known that there were weaknesses in the ballast system.
- 6.3 This being so, it would have been prudent when the list developed to have taken positive measures to isolate those tanks which were known to be flooding from the sea. More positive steps might also have been taken to establish the exact causes of water ingress, before the situation became beyond control.
- 6.4 It follows that the loss of the ship was fundamentally an operational accident brought about by unjustified reliance on the automated ballast system.
- 6.5 The final stages of the emergency were well handled and the conduct of all on board was most praiseworthy.
- 6.6 The rescue operation was very well conducted, the actions of both BT NESTOR and the RAF Nimrod aircraft being exemplary.

Figure 1

M.V. IRVING FOREST



MAIN PARTICULARS

Tonnage:
 Full scantling vessel 6 618.47 GRT
 2 956.12 NRT
 Freedecker 3 686.41 GRT
 1 447.82 NRT

Deadweight:
 Full scantling vessel 8 123 t
 Freedecker 5 302 t
 Timber Freeboard 8 932 t
 Water ballast 2 520.4 t

Length o/a 424.37 ft. 129.38 m
 Length b.p. 388.81 ft. 118.54 m
 Moulded breadth 63.63 ft. 19.40 m
 Depth to upper deck 33.78 ft. 10.30 m
 Depth to tweendeck 23.19 ft. 7.07 m

Draught:
 Full scantling vessel 26.37 ft. 8.04 m
 Freedecker 21.22 ft. 6.47 m
 Timber draught 27.78 ft. 8.47 m

Speed: 16.00 kn
 Class:
 Det Norske Veritas 1 A1, EO 24
 Finnish Ice Class 1A (1971)

EQUIPMENT

Propelling Machinery:
 Burmeister & Wain type B K 82 EF
 8300 BHP at 144 RPM
 single screw, controllable pitch

Auxiliary Engines:

2 diesel generator sets
 520 kVA, 380 V, 50 cycles AC
 1 shaft driven generator
 520 kVA, 380 V, 50 Cycle AC
 Emergency generator set
 170 kVA, 380 V, 50 cycles AC

3 self-tensioning el-hydraulic mooring winches
 8 t pull.
 El-hydraulic four-ram steering gear
 2 twin cargo cranes 12/24 t @ 18.5 m
 Air conditioning/heating
 CO2 and fire detecting system in holds
 10 reeler plugs on deck

NAVIGATION AIDS

2 radars, gyro compass, autopilot, direction finder, echo sounder, speed logs, weather fax, wireless station, VHF unit.

HATCHES

Upper deck: 4 end folding type hatches with hydraulic hinges. Loading: 1.5 t/m² one tier of containers of 20/20 t or 40/30 t. Second deck 4 end folding type hatches with hydraulic hinges. Loading: 3.6 t/m² two tiers of containers of 20/15 t or 40/30 t.

CARGO HOLDS

Double skinned holds are specially designed for forest products and containers. All surfaces are clean. T/T strengthened for heavy cargoes.

Mechanical hold ventilation 20 air changes per hour.

CARGO HOLDS	UPPER DECK		2ND DECK	
	M ³	FT ³	M ³	FT ³
HOLD No 1	914.6	32299	841.6	29721
HOLD No 2	1708.0	60317	1450.5	51224
HOLD No 3	1617.7	57128	1381.9	48801
HOLD No 4	1509.9	53222	1277.3	45108
HOLDS TOTAL	5750.2	203066	4951.3	174852
TWEEN DECK HOLD No 1	1067.7	37701	994.1	35106
TWEEN DECK HOLD No 2	1448.1	51139	1351.3	47721
TWEEN DECK HOLD No 3	1418.6	50097	1340.6	47343
TWEEN DECK HOLD No 4	1484.7	52432	1377.6	48649
TWEEN DECK HOLDS TOTAL	5419.1	191374	5063.6	178819
GRAND TOTAL	11169.3	394440	10014.9	353671

CONTAINERS	20 / 40	UPPER DECK		ON DECK
		IN HOLDS	IN TWEEN DECK HOLDS	
HOLD No 1	8	4	16	14
HOLD No 2	24	12	24	22
HOLD No 3	24	12	24	22
HOLD No 4	20	8	24	22
TOTAL	76	36	88	60