CHAPTER 6

SUMMARY OF TESTIMONIES BY SURVIVORS

6.1 Introduction

Chapter 6 is based upon 258 testimonies from 134 survivors interrogated between 28 September, 1994 and 2 February, 1997. (One Swedish survivor was not interrogated because of post-traumatic distress and two Latvians left for their home country before being interrogated. All three were passengers.)

The major part of the interrogations were conducted by the Estonian, Finnish and Swedish police and mainly in those three languages. Interrogations by Commission members have, whenever applicable, been interpreted into either Swedish or English.

Police interrogations in languages other than Swedish have been translated into Swedish and this summary is based on the Swedish text.

Some details deviate from what witnesses actually stated. The Commission has edited some detailed statements in order not to confuse the reader in cases where witnesses have made obvious mistakes, e.g. regarding deck numbers or other locations on the vessel. Statements concerning timing, estimations of list as well as all quotations are, however, at all times written as stated.

The summaries follow the witnesses' statements as closely as possible. Some of the details may therefore not necessarily correspond with facts or other findings and may consequently differ from conclusions made by the Commission in other chapters.

6.2 Summary of testimonies by surviving crew members on duty

Two officers and one able-bodied (AB) seaman were, at the time of the accident, on watch on the bridge, and one engineer and one motorman in the engine room. The system engineer was called in for duty during the night. The master of the ship's alternate crew was also on board on this particular voyage. He was to do an examination for a Pilot Exemption Certificate. He performed no duties during this voyage. There was also a trainee second officer on board.

At 0100 hrs there was a normal watch change for the bridge officers. Normally the relieving officers arrived on the bridge 5–10 minutes before the change and the relieved officers left the bridge about 5 minutes after the change.

The trainee second officer, the AB seaman of the watch, the third engineer, the motorman on watch and the system engineer survived. All of them have been interrogated several times by the Commission and the police. The other surviving crew members and passengers have been interrogated by the Estonian, Finnish and Swedish police and some also by Commission members.

6.2.1 Summary of testimonies by the trainee second officer

The trainee second officer was interrogated five times:

1. 29 September 1994 in Turku by the Finnish police.
2. 29 September 1994 in Tallinn by the Estonian police.
3. 7 October 1994 in Tallinn by the Estonian State Security Police.
4. 17 October 1994 in Tallinn by Commission members.
5. 28 August 1996 in Tallinn by the Estonian police.

The basis for the present summary is the earliest testimony. Where subsequent interrogations reveal more information or contradict the earliest testimony, the later testimonies are referred to in square brackets.

The trainee second officer was on board to be trained for deck officer's duty aboard the MARE BALTICUM, a recently acquired passenger ferry. He had passenger cabin number 4103 on deck 4.

He was on the car deck and followed the loading between 1520 hrs and 1830

hrs. Between 1520 hrs and 1845 hrs [4]. All the lorries were lashed down with straps and chocks were used for the cars. Heavy trucks were loaded centre-line aft and smaller trucks and cars at the forward end. Although this witness left shortly before the loading was completed he understood that they were carrying a full load on the car deck. When in Tallinn the ship was without list, but in the open sea, the strong wind caused a starboard list of 2–4 degrees.

The trainee second officer went to the bridge at about 2020 hrs. The master together with the master of the alternate crew came up to the bridge after 2100 hrs. Both stayed on the bridge for 20–30 minutes.

A large wave hit the ship's port bow at about 2300 hrs. The master arrived on the bridge about 30 minutes later and stayed for 15 minutes. He asked the third officer whether all four engines were running and got an affirmative answer. The trainee second officer then heard the master's order to activate the stabilisers after passing the waypoint. The master left the bridge about 15 minutes before the ESTONIA reached the waypoint. Her speed at this time was 14–15 knots. The waves and the wind came from different directions, the wind being more southerly than the waves. The wind was southwest and veering west [4].

After the ESTONIA changed course, the second officer B on the watch told the trainee second officer that the speed was somewhat reduced because of the stabilisers. At about 0000 hrs the sea was heavy.

After the waypoint the AB seaman on watch arrived after completion of his round. He reported that everything was normal but that people were seasick. The trainee second officer left the bridge for his cabin about 0030 hrs or 5 to 10 minutes later. He also said that he left at 0030 hrs when the AB seaman started his next round and that the speed was about 14.5–15 knots [4, 5]. He was in his cabin for a couple of minutes and then went to the Pub Admiral. He thought that he saw the AB seaman on watch in the doorway to the bar. In a later testimony [3] he stated that he saw the AB seaman in the staff doorway. He also stated [4] that the time was 0030–0040 hrs. He went back to his cabin at about 0050 hrs.

He went to bed but was not yet asleep when, after 5–10 minutes, he heard a strange unfamiliar sound which could have been a blow or something like a vibration [4]. He could not say where the sound came from but after this, the ship heeled over to starboard. He got the feeling that something was amiss [2]. He started to dress to get out on deck quickly. Before he had put on his shoes, the list increased and the table slid towards the door.

He left his cabin and found the corridor empty. Up on deck 5 there were some 20–30 people running to and fro. While moving between decks 6 and 7 on the main staircase he heard a noise as from a blow and thought this was the noise of trucks moving [4]. The list increased and people were hanging onto the handrail which came loose. People fell to the floor and there was panic. In the staircase several injured people, drunks and half-dressed people were trying to ascend. This was difficult, however, due to the panic. It was also difficult to climb between decks 6 and 7 because the handrail was loose. The witness managed to climb up to deck 7 together with the boatswain [5] and now the list was so great that it was impossible to walk on the carpets, it was difficult even to crawl. They helped each other out to the open deck and he estimated the list at this time to about 45 degrees [5].

On the open deck 7 there were 70–100 people; in another testimony he put the number at 150 to 200 [4]. Together with other crew members he started to distribute lifejackets and after a while other crew members started trying to release lifeboats. Others threw lifejackets to people who were unable to climb the stairs.

He left the ship, jumped into the water and looked at his watch which showed 0130 hrs. In other testimonies [3, 4] he has stated that he looked at his watch, ran aft and slid into the water. When he looked at his watch the stern was already under water up to the stabiliser fin [4]. He left the ship when the list was approximately 90 degrees, the stern was into the water and the ship's siren sounded [5]. He came under a liferaft with his lifejacket down around his waist. Because his feet and one hand were tangled in ropes, which he believed belonged to the raft's sea anchor, he was not able to get onto the first raft, which drifted away. Another liferaft drifted towards him upside-down and with the help of a young man he managed to climb on board. On top of this raft there was also a naked elderly man and beneath the raft a Swedish man. They were all rescued by a helicopter at about 0700 hrs.

6.2.2 Summary of testimonies by the able-bodied seaman (AB seaman) on watch

The AB seaman on watch was the only survivor of those on duty on the bridge during the critical hours. His duties were to make 25–30-minute rounds in the ship. The round commenced 30 minutes past every hour. During the rounds he was to check the general order and fire safety in the accommodation and on the car deck. Between rounds he was on duty on the bridge as a lookout and handyman.

The AB seaman has been interrogated eight times:

1. 29 September 1994 in Turku by the Finnish police.
2. 29 September 1994 in Turku by Commission members.
3. 3 October 1994 in Tallinn by the Estonian police.
4. 17 October 1994 in Tallinn by Commission members.
5. 17 November 1994 in Tallinn by the Estonian police.
6. 3 December 1994 in Tallinn by the Estonian State Security Police.
7. 31 March 1995 in Gothenburg by Commission members.

8. 25 January 1996 in Tallinn by the Estonian police.

This summary is based on the earliest testimony. When subsequent interrogations reveal more information or contradicts the earliest testimony, the later testimonies are referred to in square brackets.

At 2230 hrs the AB seaman started his regular watch round. The round started from the bridge and he continued to deck 7 where the crew's cabins were. From deck 7 he went to deck 8 to check the rest-rooms and from there down to the car deck where he arrived at about 2235 hrs. On the car deck he checked the lashings which he found were in order, the cargo was not moving. It was stormy weather and he noticed some water coming in through the ventilation channels. This small inflow of water on the car deck was normal during heavy weather and he had seen it earlier. He stayed for about 15 minutes and continued through deck 1 to deck 0 and then back up to the place where his round commenced. Shortly after his arrival on the bridge [5], the master together with the master of the alternate crew arrived and talked in a normal manner with the officers. They left after 5–10 minutes.

On the round starting at 0030 hrs, the weather was worse than earlier. In the last testimony [8] the AB seaman said that he was not sure about leaving the bridge at exactly 0030 hrs. In the same testimony he stated that after leaving the bridge he went into cabin 750 and talked to a friend. He stayed less than a minute, saw some friends on deck 7 and stopped to talk to them. Then he went into the laundry room where he collected a jacket, passed two checkpoints and went on into his cabin, where he left the jacket. After that, he went up to deck 8 where he saw some friends in the day room. Without being quite sure about it he thought that he walked further down looking for a girl who worked in the Baltic Bar, but he did not see her. He also stopped at the Pub Admiral to look for another girl.

While he was on the car deck the ship was moving so heavily in all directions that it was difficult to walk and he had to support himself against the bulkheads. When he was approximately one metre from the ramp, a heavy wave hit the bow. He gave the time as 0045 hrs [3]. In another statement [4] he said 0035 hrs at the latest. Later [5] he stated that he was on the car deck between 0035–0040 hrs. He also said [6] it was about 0040 hrs. In the last testimony [8] he stated that the time was 0050–0055 hrs.

He nearly fell due to the effect of the wave. When the wave struck the bow a particularly "hard sound" was heard from the bow, a sound that stood out from the others. The sound was accompanied by a heavy vertical ship movement that made him fall [2]. The bow was rising when the blow was heard [4] and continuous heavy waves raised it further.

The blow sounded like two heavy metal pieces clashing together with great force. This lasted for about half a second. He notified the second officer B on watch via portable radio and was ordered to stay and try to determine the source of the sound.

He stayed for a while on the car deck but everything was in order and the visor and the ramp were obviously closed as the signal lamps were green. In another testimony [4] he said that he stayed for 5 minutes, that he checked the lamps and that the ramp was closed. In yet another testimony [7] he stated that he opened a locker to see the lamps, which were green, and that he asked for permission to leave the car deck.

On his round upwards he passed the Baltic Bar [5]. He caught up with the master and entered the bridge just behind him at about 0058 hrs. The watch changed at this time. The master noted that the ship was rolling heavily and that they were behind schedule in spite of having all engines running. He also said that the master said they were one hour behind schedule [4, 7]. In other testimonies [3 and 4] the AB seaman said that he came to the bridge at 0100 hrs, that he could see the top of the jack pole indicating that the visor was there, that the master arrived after him and that the second officer A and the fourth officer were on watch. In still later testimonies the AB seaman stated that prior to his arrival on the bridge the watch had already changed [6] and the relieved officers had left [7]. In his last testimony [8] he said that after leaving the car deck he went to deck 1 and then to his checkpoint in the sauna on deck 0. After that he worked upwards at his normal speed, looked into the Night Club and the Pub Admiral, and continued to the information desk where he looked at a clock which showed about 0100 hrs. Subsequently he went up to the bridge and arrived just behind the master.

When the AB seaman came up to the bridge, the second officer had received a telephone call from below, saying that strange blows had been heard from below. In a later testimony [2] he stated that the second officer A said that he had had a telephone call about noise from the "bow door". The AB seaman also stated [8] that the 2nd officer A had a telephone call from the engine room about heavy blows. The second officer A ordered the AB seaman to go down to the car deck to check the "bow doors" and also to take a look at the general situation. In another testimony [4] the AB seaman said that there were strange blows from below and that he got an order to check the ramp together with the boatswain, and that this happened less than 10 minutes past one o'clock. He also stated [5] that he and the boatswain were ordered to go down together to check some blows. Later [6] he said that they got orders to go down and check the ramp. In a still later testimony [7] he said that he was ordered to check the ramp and visor together with the boatswain and to see that they were properly secured, and he also stated that the orders were given in a routine manner. He tried unsuccessfully to contact the boatswain via portable VHF radio. He told the second officer A that he could not reach the boatswain. The second officer said he would telephone the boatswain in his cabin. It was an unusual step to wake the boatswain, but he was the

crew member responsible for both visor and ramp [7]. The AB seaman stayed less than 2 minutes on the bridge before being ordered down again [7].

When he was on his way down, people were already asking for help because the ship's list was so heavy that some could no longer manage to walk. In the last testimony [8] he stated that he helped two passengers on deck 7 who had fallen over. He also stated [2] that he noticed a slight list on his way to the car deck. In another testimony [7] he said that he ran down straight from the bridge to the information desk. He also stated [8] that on his way down he passed the Baltic Bar and looked through the door for a friend. He couldn't see his friend but observed that the musicians had stopped playing.

The situation calmed down somewhat when the ship heeled over to starboard. He ran to the information desk on deck 5 to ask them to unlock the car deck doors because he had been ordered to go there. He did not yet think that the ship would go down. In the last testimony [8] he said that when he arrived at the information desk the girl there was exchanging money for a passenger. The AB seaman had to wait for a couple of minutes. While he was waiting, the ship heeled over so much that all objects fell. He continued down to deck 4 where the staircase was full of people and he realised that the situation had become serious. The list was now around 25–30 degrees.

He ran to deck 7 and tried to reach the outer deck but fell. Lying on the deck he reported to the officer on watch over his portable radio that people were screaming in panic, saying that "deck 1 is under water". In another interrogation he stated that the people said "there is water on deck 1" [2] and in a further interrogation he stated that one passenger, either from cabin 1069 or 1096, had told him that there was water on deck 1 [6]. This was new information to the bridge [5]. The bridge was surprised by this information [6]. The officer ordered him to go down and check the situation even though the AB seaman thought that the situation was hopeless.

He managed to support his feet against the bulkhead and to give some lifejackets to passengers. Out on deck he realised that he had lost his portable radio [5].

When the ship heeled over "altogether", he managed to save himself by getting to a liferaft on the ship's side. At this moment the funnel and three quarters of the ship were already under water. In a later testimony [7] he said that he was in the liferaft at 0124 hrs and that the ship had a 90-degree list when he left. In the last testimony [8] he said that he looked at his watch several times after midnight because he was instructed to do so while on duty. At 0125 hrs the ship's bottom was upwards and he was floating on a raft.

When the AB seaman slid into the water he lost contact with one of his friends. He fell into the sea from the raft but someone pulled him back again. He also managed to pull two girls into the raft.

When the ship sank it turned upside down and went down stern first. He noticed that the bow visor was missing.

6.2.3 Summary of testimonies by the third engineer

The third engineer was interrogated seven times:

1. 29 September 1994 in Turku by the Finnish police.
2. 29 September 1994 in Turku by the Estonian State Security Police.
3. 29 September 1994 in Turku by Commission members.
4. 3 October 1994 in Tallinn by the Estonian police.
5. 17 October 1994 in Tallinn by Commission members.
6. 31 March 1995 in Gothenburg by Commission members.
7. 28 February 1996 in Tallinn by the Estonian police.

This summary is based on the earliest testimony. When subsequent interrogations reveal more information or contradict the earliest testimony, the later testimonies are referred to in square brackets.

During the loading of the ESTONIA the third engineer heard on his portable VHF radio the order from the chief officer that the cars must be carefully lashed because hard weather was expected.

The third engineer was on duty from 0000 hrs. His work station was the engine control room. Wind velocity was 20–25 m/s (according to the ship's anemometer) and the ship's speed 15 knots. The run seemed normal despite the heavy weather. At 0030 hrs [3, 5] the stabilisers were activated.

When he started his watch he looked at the instrument panel and observed that the ship had a starboard list of approximately one degree. The fourth engineer, who had the watch before the third engineer's, told him that he had tried to compensate for the list, which was due to the distribution of the cargo, by filling the port heeling tank. However, the tank was already full and the list could not be fully compensated.

In the control room there was a monitor connected to video cameras on the car deck and in the engine room. The cameras scanned automatically every five seconds but it was possible to stop the scan manually and to keep a desired picture.

He saw on the monitor that the AB seaman on the watch was on the car deck at about 0100 hrs or five minutes later [4]. In another testimony [7] he stated the time to be 0055–0059 hrs, that he saw the AB seaman at the ramp and that there was no water at this time.

At 0115 hrs he perceived two heavy waves, one after another, and they could really be felt. Later he stated that the time was 0110 hrs [2], 0114 hrs [6] and also that he looked at his watch which said 0113 hrs [7]. He had never before experienced such powerful blows against a ship. The ship was sailing practically straight into the waves and consequently their full force was directed towards the bow. He immediately looked in the monitor. At 0115 hrs he saw in the monitor

[2] that water was coming in from the bow or – as stated in another testimony [4] – that a huge amount of water was pressing in from the sides of the ramp. At the same moment he heard the AB seaman on the watch report "water on the car deck". In other testimonies [3, 5] he said that the AB seaman's words were "Bridge from watchkeeping seaman: there is water on the car deck". The inflow of water was enormous. In fact, the monitor picture became unclear because the camera was sprayed with water. He locked the camera on the ramp and, according to him, the same picture was displayed on the bridge monitor [5].

The effect of the inflow of water was immediate, the ship developing a 2–3 degree list to starboard. She also started to roll, 3 degrees to starboard and 1.5 degrees to port [6]. Then she heeled even more to starboard and subsequently the starboard list became permanent. Loose objects started to move. At this time the system engineer and the motorman entered the control room.

Within a couple of minutes the list increased to 10–15 degrees while the ship continued with all four main engines and two auxiliary engines still running. At this time the fourth officer called and asked if the list could be adjusted by increasing the amount of water in the port heeling tank. In a later testimony [2] he said that this question was asked at about 0120 hrs. In another testimony [5] he stated that the time was 0121 hrs and that he heard the alarm – *Mr Skylight to number one and two* – at the same time. He tried to pump in sea water, hoping that the list might have created some space in the tank but the pump only sucked air. From this time on, the starboard list increased rapidly [2].

Approximately one minute after the alarm *Mr Skylight to number one and two*, the boat alarm went out over the public address system and the alarm bells started to ring [6].

Within a couple of minutes the ship had developed a 20–25-degree list to starboard and the port main engines tripped because of an automatic shutdown, i.e. the lubrication system was no longer working. When this happened the list was 30–35 degrees and he tried to restart the engines but without success [2]. The ship's speed was then 5–6 knots. Some minutes later, engine no 4 tripped for the same reason and after a while also no 3. The time was then 0120–0125 hrs [5]. He reported to the fourth officer via portable radio that the main engines had tripped [4]. They were running at 560 rpm before the accident and around 500 rpm before they stopped [5]. In another testimony [6] he stated that the engines were running at approximately 400 rpm. With the help of railings, he crawled to the control panel and tried to restart the engines [6].

He sent the motorman up when the engines had tripped because the motorman was in a state of near panic. In a later testimony [3] he said that he sent the motorman to the bridge to report. The system engineer left the control room at the same time.

At about 0130 hrs the list was approximately 40–45 degrees. At this moment the auxiliary engines also stopped and the emergency generator on deck 8 started automatically. In a later testimony [6] he stated that the list was around 70 degrees when the auxiliary engines stopped. The fourth officer also contacted him at this point and asked if it was possible to pump out fresh water into the sea from the tanks on the starboard side. This was no longer possible due to lack of electric power.

The third engineer felt there was nothing he could do in the control room any more and told the bridge that he was going up on deck to check the function of the emergency diesel generator [2, 7]. When he left the control room there was no water there and all watertight doors were closed. In a later testimony [5] he said that he left at about 0130 hrs and that the list was at this time 70–75 degrees. He also said that he left about 0125 hrs, not earlier because he then looked at his watch for the last time [7].

The third engineer took the engine staff's own staircase to deck 8, to the emergency diesel generator. On his way up he heard noises indicating that the cargo was moving. He checked the emergency generator, which was still running. The ship was at this time lying on her side, i.e. the list was 90 degrees. Because of this, the emergency generator shut down almost immediately. He had no more duties and moved aft along the hull where there was a crowd of people. When the emergency diesel generator stopped, the hard plastic flooring on deck was falling over him [6]. (This flooring consisted of 30x30-centimetre 14-millimetre-thick, structured polypropylene tiles that snapped together.)

He saw that some passengers had opened liferaft containers but that they did not know what to do with the rafts. He went to help, but at the same moment a wave washed him into the sea.

He was not wearing a lifejacket but he found two which he put on. He found a damaged lifeboat, floating upside down, with four people sitting on it. He managed to climb on. After a while another person also got up on this lifeboat but this person later died.

At a distance of about 80 metres he saw the ship go down. She was lying on her starboard side as she sank, stern first. During the last few moments the bow pointed upwards at 45 degrees.

He observed that the bow visor was missing and assumed that the heavy waves had torn it away.

The third engineer assumed that he was one of the first to be rescued. He and the others from a lifeboat were picked up by a helicopter at about 0350 hrs [2].

6.2.4
Summary of testimonies by the system engineer

The system engineer was interrogated five times.

1. 28 September 1994 in Turku by the Finnish police.
2. 29 September 1994 in Turku by members of the Commission.
3. 29 September 1994 in Turku by the Estonian police.

4. 10 October 1994 in Tallinn by the Estonian State Security Police.
5. 13 January 1996 in Tallinn by the Estonian police.

This summary is based on the earliest testimony. When subsequent interrogations reveal more information or contradict the earliest testimony, the later testimonies are referred to in square brackets.

The system engineer was asleep in his cabin and was called on duty at about 0030 hrs by the third engineer due to vacuum problems and subsequent difficulties in emptying one of the toilets. In a later testimony he said he was called at 0045 hrs [5]. He arrived in the engine room on deck 0 at about 0045 hrs to solve the problem. He felt a couple of hard shakes when a wave hit the bow. The shakes were stronger than usual for this kind of weather. He concluded that the weather was foul.

It took about 20 to 25 minutes to find the cause of the vacuum problem and make the necessary repairs [3]. He stayed in the engine room for about 25 minutes [4]. Later in the same testimony he specified that he did not leave the engine room until he realised that the ship was going to sink.

On finding the cause of the problem, which was air entering the vacuum system, he felt that something was amiss because the ship heeled over to starboard. In a later testimony [3] he stated that he felt two or three heavy blows and that the electrical panels started to shake in their fastenings. After these blows, the ship started to heel and some cans slid about. After the next blow, the cans, which had stopped, started to roll to the other side. In a later testimony [5] he said that he heard a heavy blow, heavier than from a wave. Less than a minute later a new blow came and the ship started to heel.

Because of the list he went to the engine control room where the third engineer and the motorman were. The move took about two minutes. The surveillance monitor showed a great deal of water entering the car deck from both sides of the ramp, possibly more from starboard than from port. He was not able to tell whether water was also coming in from the top of the ramp because the camera did not cover this area. Shortly after his arrival in the control room, the watertight doors were closed.

In later testimony [5] he said he went to the control room one or two minutes after the list. The third engineer ordered him to check the car deck with the surveillance camera. The cars were in place and he could not see any water on the deck but water was pressed in at the ramp. He was sure that the third engineer also saw this, presumably before himself.

In the latest testimony [5] the system engineer made a drawing to illustrate what he saw in the surveillance monitor (Figure 6.1).

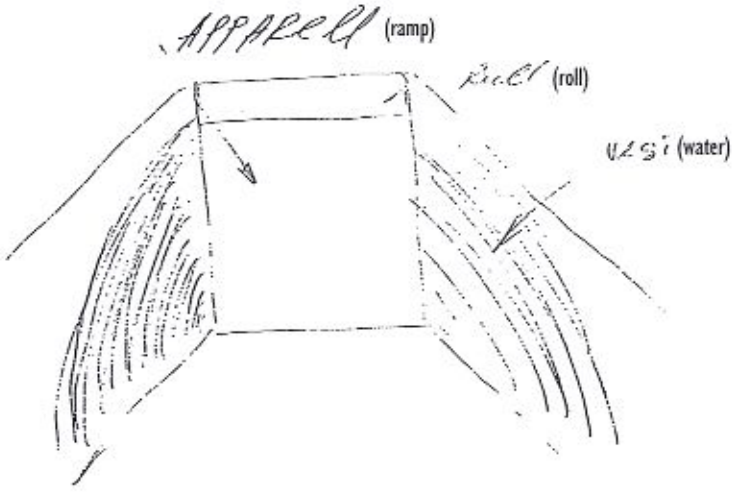
The three wondered if the bow visor had opened because this amount of water could not possibly enter only because of some damaged seals. The water was entering continuously and not only in connection with waves. The ship developed a 30–40-degree list and the engines tripped, first two and then the third and finally the last remaining engine. The system engineer did not know if all four auxiliary engines were working or only two of them.

While still in the control room, the system engineer heard the bridge ask if it was possible to right the ship. He thought that the third engineer had by that time informed the bridge about water entering the car deck. The pumps were running to drain the water. The bridge also asked if it was possible to reduce the list by pumping water between the heeling tanks. While the system engineer was following the events on the monitor he was unable to hear the third engineer's reply.

He wanted to call the chief engineer but before he could reach the telephone everything fell over. He managed to crawl to the central table but this broke loose from its welds [5].

After the engines had stopped he heard the alarm *Mr Skylight to number one and two* over the public address system and soon after that the watertight doors were closed and the boat alarm sounded. He asked the third engineer what was going on and why the water was coming in, which he was able to see on the monitor, but got no reply [4]. Later in this testimony he clarified that he did not observe any water entering the car deck, only that the third engineer told him about it.

Figure 6.1 Drawing made by the system engineer showing what he saw in the surveillance monitor.



When the list was about 45–50 degrees, he and the motorman left the control room. At that point the electric power was still on. In a later testimony [2] he said that they left when the list was about 60 degrees and that he, on the monitor, saw the cars shifting approximately one metre to starboard when the ship was at about 45 degrees of list. When he had reached deck 6, the auxiliary engines stopped and after two or three seconds the emergency generator started and the power came on again. The system engineer, together with the motorman, gained the outer deck 8 amidships, quite near the emergency generator which worked until the list was about 90 degrees. Their climb, he stated, took one minute or two [5].

Out on deck 8 he saw crew members preparing liferafts in case the ship should turn over. By this time the list was already too heavy to permit the release of lifeboats. People had released inflatable rafts on the ship's port side and were able to slide into the sea when the list increased.

When the ship was practically on its side, a typhoon signal was given. This meant that everybody had to save themselves. In a later testimony [2] the witness stated that there was a message over the public address system, advising passengers in the water to stay clear of the sinking vessel. He also stated [3] that he saw the second and third officers leave the bridge at that time and start helping to release rafts. At that moment the system engineer was together with other people, mostly crew members. They waited for a relatively safe moment and slid into the water in a raft, holding on to ropes.

When the ESTONIA sank, stern first, he could see that the bow visor was missing. He was about 20 metres from the ship in a raft together with 9 to 10 others. He has estimated that the time from his first observation of water entering the car deck to the sinking was 15–20 minutes.

In the raft he, together with the AB seaman and the motorman, helped others aboard and finally they were 16 people. The last person got into the raft about two hours after the sinking; in a later testimony [4] he said 1.5 hours.

At 0815 hrs the system engineer together with the others was rescued by two helicopters.

6.2.5
Summary of testimonies by the motorman

The motorman was interrogated three times:

1. 29 September 1994 in Turku by the Estonian State Security Police.
2. 29 September 1994 in Turku by Commission members.
3. 31 March 1995 in Gothenburg by Commission members.

This summary is based on the earliest testimony. When subsequent interrogations reveal more information or contradict the earliest testimony, the later testimonies are referred to in square brackets.

This was the motorman's first voyage as a crew member on the ESTONIA [2]. He was on duty that night from 0000 hrs together with his supervisor, the third engineer. When on duty, he made a round in the engine room and checked that everything was working normally. After the round he went to the control room and the third engineer made his round. During the third engineer's round the motorman received an order from the bridge to activate the stabilisers.

At about 0046 hrs the motorman saw on the monitor that there was a small trickle of water pouring in on the starboard side of the ramp. He thought it was rain which had penetrated the seal. On this occasion he was alone in the control room and when the third engineer returned the motorman went to an adjacent workshop. In a later testimony [3] the motorman, questioned about seeing water entering at 0046 hrs, stated that he had since given it much thought but that he was no longer sure of having seen it. After further questioning on this topic, he stated that he was no longer certain of having said so at all in the first testimony.

While he was working in the workshop, the ship suddenly developed a list which he found strange. He went to the control room and the 3rd engineer told him that the situation was serious because a wave had broken the ramp. On the monitor he saw that there were big waves on the car deck and that the water surface was level with the cars. Right after this, several lamps started to flash "boat alarm", meaning an order to the lifeboat groups to man the lifeboat stations.

At this time the system engineer arrived and the watertight doors had been closed. The water pumps were turned on and from the bridge they received orders to try to do something with the pumps. At this time the list increased and because loose objects started to move it was no longer possible to stand upright. At a certain point the main engines tripped. The motorman also heard noises of movement on the car deck. It was now obvious to everyone that the ship was going down.

Then the motorman and the system engineer left the control room through the emergency exit. The list at this time was about 50 degrees [2]. When they were on their way up, the auxiliary engines stopped and the emergency generator started automatically. The list was about 90 degrees when they reached deck 8 and at that time the emergency generator stopped. The motorman put on a lifejacket and slid into the water where he saw the ship sinking stern first. He could see that the bow visor was missing.

6.3
Summary of testimonies by surviving passengers and off-duty crew members

6.3.1
Testimonies concerning cargo lashings

Two able-bodied seamen have testified about the lashing of cars, lorries and trailers prior to the journey. Both were

involved in this work. Trailers and large vehicles were secured with four lashings and trailer chocks. Passenger cars were not lashed but parked with handbrakes on and in gear.

While loading, the two seamen were ordered to do the lashings with care because winds up to 25 m/s were expected. Both were certain that vehicles were secured in accordance with their instructions and with the equipment to hand.

Both stated that the bow visor was properly closed before sailing.

6.3.2
Reports from deck 1

On deck 1 there was one cabin department with 124 cabins and beds for 358 passengers. The cabin area extended forward from amidships. In the centre line of the cabin department there was a central corridor with six upward-going staircases. Several transverse corridors on both sides joined at this central corridor. The six staircases joined in the casing, ending up as three on deck 4. The middle one of these joined the main staircase, the foward one continued to deck 7 (Figure 6.3).

From this deck there were 22 survivors. Three of them were crew members from the engine room and 19 were passengers from the cabin area. Figure 6.2 shows the engine area and the cabin department with all known locations of survivors.

Many passengers were unable to sleep prior to the accident due to the ship's heavy motion and the noise and vibrations from waves hitting the bow. Several passengers were seasick. Some had been sleeping and woke shortly before the accident due to the motion and the noise.

One witness, in a starboard forward cabin, heard some hard thumping and something banging. She thought it was strange and spoke to her friends about it. She had a horrid feeling and left her cabin. Her friends said they would follow. She went up to deck 7 and sat in a chair for a few minutes when she suddenly heard a heavy blow and the ship started to heel over.

In another cabin, further aft on the starboard side, were two persons. They reported heavy ship motion. Every time the ship pitched, one of them reported, he heard blows against the hull, as if someone were hitting it with a large stone. This witness was worried and discussed the sounds with the other, feeling that something was amiss. He got out of bed and started to dress. The other witness, in the same cabin, did not hear these blows but was also worried. After a while she heard a faint, new bubbling sound from above, like water being poured slowly. She stated that this happened a little after one o'clock: a wristwatch had beeped the hour and she had also looked at her own watch. She stayed in bed half asleep for about five minutes when there suddenly was a loud, scraping, howling, creaking and screeching sound from overhead, quite close, as if something large and heavy was sliding. A witness from a nearby cabin has also reported the same kind of noise. After this the ship heeled. They were convinced that something was amiss.

Several witnesses have reported being awakened by loud noise or bangs. Three passengers fell out of their beds because of the ship's motion. Shortly afterwards, they heard a tremendous thud, so "hard" that one of them, who was now standing, was thrown against the bulkhead. It was like a collision. The ship immediately started to roll "incredibly". Another witness has stated that, around 0100 hrs, he heard a familiar hydraulic sound, the kind "that is made when the bow visor opens and closes". He lit a cigarette and shortly afterwards, still smoking, he heard a clear metallic blow or crash. After another one or two minutes he heard the same sound again. He dressed and left his cabin. When just outside his cabin door, he estimated the time to 0115–0120 hrs, the ship raised its bow and heeled to starboard immediately after.

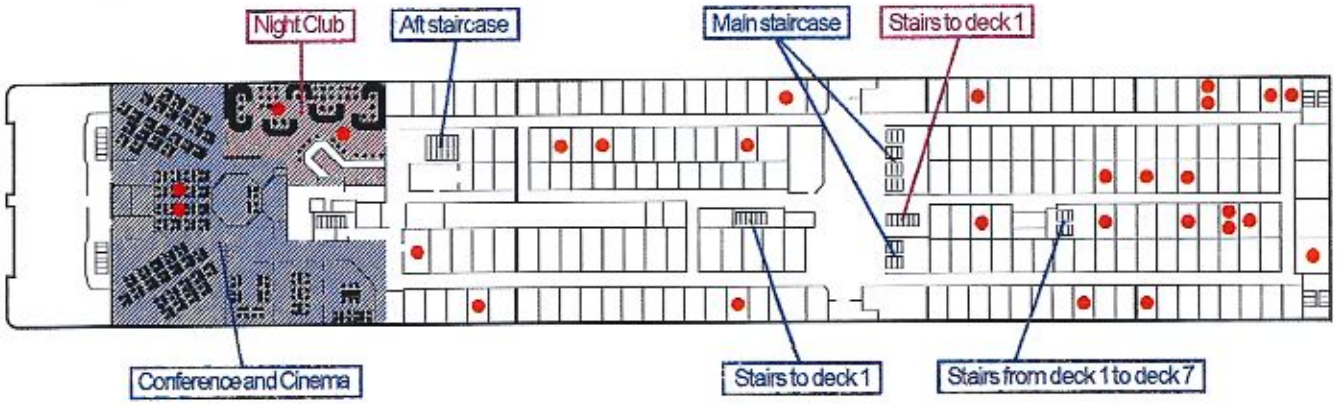
Another witness opened his cabin door. The corridor outside was empty, but there was a thin trickle of water on the floor. At this time the ship had only a very slight list. He ran out in his underwear. The ship remained starboard heeled. In the central corridor there was water on the floor.

At about the same time most cabin doors were opened and half-dressed passengers emerged into the corridors. Many were in panic, shouting and screaming. In the central corridor they ran back and forth searching for staircases and colliding with each other. On one staircase, a woman stood in her night-dress, screaming hysterically. In a cabin doorway an elderly woman was hanging on, trying to pull herself out.

One witness, in a forward central cabin, left after hearing an alarm in Estonian. At this time he saw water coming into his cabin.

Figure 6.2 Plan showing deck 1. Red dots mark all known locations of survivors at the onset of the accident.

Figure 6.3. Plan showing deck 4. Red dots mark all known locations of survivors at the onset of the accident.



When passing deck 2 up the staircase, several witnesses reported cold water running down the bulkhead and onto the floor. One witness saw water spraying from chinks in the closed doors leading to the car deck. He estimated one decimetre of water on the floor.

It was increasingly hard to move because of the list. Some paralysed and exhausted passengers were standing on the staircase. They were passed by others.

6.3.3 Reports from deck 4

On deck 4 there were two cabin departments, one forward and one amidships, containing 98 and 81 cabins respectively. In the midship department there were beds for 200 passengers and in the forward for 204 passengers. The cabin departments were separated by the entrance hall with the main staircases. Aft there was a conference area which, at the time of the accident, was closed. Close to the conference area was the Night Club, which was open.

In the forward cabin department there were three parallel longitudinal corridors, one central, and one on each side. Between the corridors there were cabins. From the central corridor one staircase led to deck 7. The three corridors ended forward at a transverse corridor and amidships at the entrance hall. The central corridor ran between the two main staircases. At the forward ends of the port and starboard corridors two staircases led to the boat deck, deck 7.

In the midship cabin department there were also three parallel longitudinal corridors, with one transverse corridor connecting the central corridor with the starboard corridor and another connecting the central with the port. The longitudinal corridors ended forward at the entrance hall and aft at the aft staircase and the conference department.

From deck 4, 32 people survived. Most remembered their cabin numbers. Probably seventeen escaped from the forward cabin area and six from the midship cabin area, two from the Night Club, one from the lavatory close to the conference area and two from the cinema in the conference area. Four survivors from this deck cannot remember their cabin numbers. Figure 6.3 shows the plan of deck 4 and the locations of survivors.

Reports from the forward cabin department

In the forward cabin department a few witnesses have reported that they were seasick. One was woken, he says, at about 0000 hrs by a noise which made him worried. It was a dull sound, but powerful and as if something was sliding from one side to another, hitting hard against the ship's hull. The noise reverberated through the entire ship. Because of this noise the witness decided to leave his cabin. Another witness has said that he heard strange blows while undressing in his cabin, a sound like metal against metal vibrating through the entire ship. It seemed to him that the blows were coming from the bow.

One witness, in a starboard cabin, was lying awake in his bed wondering about the blows from the waves and the ship's speed which he thought too high for this kind of weather. The ship was pitching. He noted that the sound from the engines suddenly changed, as if the ship was slowing. After a while he heard an enormous crash and the entire ship shook. He looked out through the window and was not sure whether the ship was moving or not. After the blow there was the familiar roar of the waves hitting the bow again. Suddenly there were two metallic, clanging sounds each coming a moment after a wave hit the bow. When the next wave struck he heard the same sound again three times and after that a rustling sound beneath his cabin from the car deck. He remained in his bed for another moment. Then he told his roommate that something was wrong and that they had to get out of their cabin. At this time the ship had a slight list.

Another witness, also lying seasick in bed, was listening to the sounds. He fell asleep now and then but woke up because of blows. Suddenly he was woken by a blow and because the ship rolled heavily three to five times. After a further, powerful, blow he heard two or three loud scraping sounds a few seconds apart.

The ship heeled over and things fell from the table to the floor. Immediately after another heel all loose objects slid towards the cabin door. After the last heel, the vessel remained listed to starboard and he left his cabin rapidly. He took with him his alarm clock which had stopped at 0102 hrs.

One witness felt that the ship was behaving strangely as if ploughing heavily right through the waves. At the same time he heard loud metallic thumps and noted that the engines stopped. The time was around 0105 hrs to 0110 hrs. Another witness was awakened by a huge bang, sounding as if the ship collided. He fell from his bed to the floor. A further witness was woken by an enormous crash. All loose objects slid to the floor and two men, who were sleeping in the upper beds, fell to the floor.

One witness could not sleep because of vibrations and the sounds of the ship hitting the waves. At around 0100 hrs he heard two bangs one shortly after the other. He got up, dressed and opened his cabin door. There was no one in the corridor but some cabin doors were open and he saw people inside. He went aft while the ship started to heel moderately.

Later the list increased. Many cabin doors were open by this time. In the corridor there were many people, some of them naked, others wearing only underwear. There was panic and people were running both aft and forward screaming. Some of them were standing still, apparently in shock. According to one witness, at approximately 0115 hrs there was an alarm call, "Häire, häire, laeval on häire!", meaning "Alarm, alarm there is alarm on the ship!" in Estonian. (The Estonian language has similarities with the Finnish but is not understood by Swedes.) It was a woman's voice and she sounded afraid or injured. The voice was very weak. Some of the passengers in this cabin department ran aft to the entrance area and some forward to the forward starboard and port staircases.

The corridors were full of people fighting to reach the port staircase. A witness threw himself forward and got his hands on the handrail. For older people, it was impossible to move upwards.

On the starboard forward staircase much sea water came from above, and the people climbing became soaking wet.

Reports from the midship cabin department

One of the witnesses, a dancer on her first working day, was trying to find her cabin after the show which finished at 0030 hrs. She got lost and came outside the car deck where she heard a crash. She finally found her cabin, got to sleep but was awakened by another crash. Other witnesses were wakened by belongings and loose objects sliding about in their cabins.

One witness could not sleep because of the heavy sea. He heard a rolling sound from the car deck below and got a feeling that something was wrong. Belongings started to fall to the floor. Directly afterwards, there was a loud metallic bang and the vessel heeled over.

Another witness went forward along the starboard corridor followed by his parents and his girlfriend. When he came to the entrance area there were many people there. He estimated the list at this time to be about 10–15 degrees. The lights were still on.

One witness, from a cabin very close to the entrance hall, was going aft but fell into a cabin where there were already two people. She pulled herself out into the corridor again, leaving the two behind. Most cabin doors were open but only a few persons were in the corridor. The witness walked along the bulkhead and jumped over cabin doorways.

Reports from the Night Club

In the Night Club there were six people, three passengers and three crew members. At about 0115 hrs one witness noticed that objects started to move to starboard. He rushed out and up the aft staircase. He reported no crowding.

In the lavatory outside the Night Club and close to the aft staircase there was another passenger. While leaving, in the hall, he saw a crack in the ceiling and water pouring down. He went up the staircase quite early, before there were any crowds, to the open deck 7.

Reports from the entrance foyer

The foyer was a rather large open space. The list rendered movement there very difficult. The staircases were situated on the ship's centre line and became difficult to reach.

One witness from deck 1 was ahead of the others and did not see other people until he reached the entrance foyer on deck 4. On deck 5 he passed a man lying on the floor, injured or maybe drunk this witness thought, because the ship's list was not too heavy at this moment. He also met two male crew members and told them that he had seen water below. They rushed downstairs.

Another witness arrived on deck 4 somewhat later and saw many people in panic. He held on to the handrail and managed to cross the open area near the bureau d'échange where the floor was soaking wet. Two girls fell from the staircase and struck the bulkhead. One of them probably died immediately. Another witness saw two young women wearing only panties just standing still, holding on firmly to the handrail. This witness lost his grip and slid approximately 10 metres into a glazed wall which broke. He was not injured, and managed to regain the staircase. On deck 5 he saw a person lose his grip and fall into the wall, which cracked. Several people slid screaming across the foyer carpet into the wall, most of them receiving injuries.

People entered the entrance area in great numbers from both forward and aft corridors. Some were standing along the walls and on the stairs. One witness has reported that a crew member was there, trying to help passengers many of whom were just standing still with no chance of climbing upwards. Some found free handrails and started to climb by pulling and dragging themselves upwards. Gradually more and more people came. Many were lying down badly injured and bleeding, some probably dead. They had slid

into the walls or fallen from the staircases. There was full panic and chaos. Some people were trying to stand up, some just holding on. The witness who was leading his parents and girlfriend had difficulties reaching the staircases. Once there, he turned to look for the other three who were still on the other side. They could not cross the foyer because of the bodies and the crowd. They shouted and urged him to continue to climb the staircase alone.

6.3.4 Reports from deck 5

On deck 5 there was a forward cabin department, almost identical with that on deck 4, with 102 cabins and 212 beds. Amidships was the manned information desk and a forward hall with the main staircases. Two arcades, starboard and port, with a tax-free shop and several other shops, connected the forward and aft halls. In the aft hall there were the aft staircases. On the starboard side, aft of the shops, there was a lounge with easy chairs. Further aft on this side was the Pub Admiral where entertainment was going on. At the stern on the starboard side there was the Café Neptunus from where doors led out to the aft open deck where outdoor staircases led to the upper decks.

From deck 5, 31 people survived. Four of those were in the cabin area, five were on different locations in the arcade and hall close to the shops and the information desk. Fifteen were in the Pub Admiral, three in the Café Neptunus and four in the lounges. Figure 6.4 shows the plan of deck 5 and the locations of survivors. Photos in Figures 6.5 and 6.6 show Café Neptunus and the aft staircase on deck 5, respectively.

Reports from the cabin department

One witness was moving around in the forward port staircase. He noticed that the matting was soaking wet between decks 5 and 6 and also that some water was pouring down the staircase. The matting became, however, less wet further up. He stood at about 0100 hrs looking out through the windows towards the forecastle deck. He could hardly see it because of the darkness but the bow looked normal. After this he went to his cabin and approximately five minutes later the heel came.

One witness, from a forward port cabin, reported that high waves were beating against the ship and huge cascades of water rising into the air. He could not sleep due to the sound of the waves and the ship's motion. Later there were a couple of heavy bangs and he decided to get up and have a look outside. The heel came just when he was at his cabin door.

Another witness stood on the outside deck a while before going to bed, looking at the enormous cascades of water and fascinated by the sight. After a couple of hours' rest in his cabin he became seasick and stayed in bed, but listened carefully to the sounds. He had a feeling that the ship was lifting 10 to 20 metres and banging down into the water again, accompanied by heavy sounds and vibrations. Suddenly he heard an additional slight metallic sound above the normal noise of the waves and the fittings. He heard this sound for a couple of minutes, then he heard a metallic blow. After perhaps another minute, there was a faint metallic blow and after a further 40–50 seconds a very heavy metallic bang. He became worried because the noise sounded as if the hull plating was being pressed in. He realised that something was amiss. He left his bed. Soon afterwards the ship developed a starboard list. Approximately one minute after the first list and two minutes after the last bang, the engines stopped. The list was now around 20 degrees to starboard. He left his cabin in a hurry only half-dressed. He put the time from the first metallic sounds to the heel at between 5 and 10 minutes.

A witness in a cabin near the main stairway was woken by objects falling to the cabin floor due to the list. He estimated the time as 0120 hrs. He was uncertain of the timing even though he usually looked at his watch when waking abroad.

Some witnesses from various locations have stated that the engines stopped,

Figure 6.4 Plan showing deck 5. Red dots mark all known locations of survivors at the onset of the accident. Digits in red dot refer to numbers of survivors from this area.

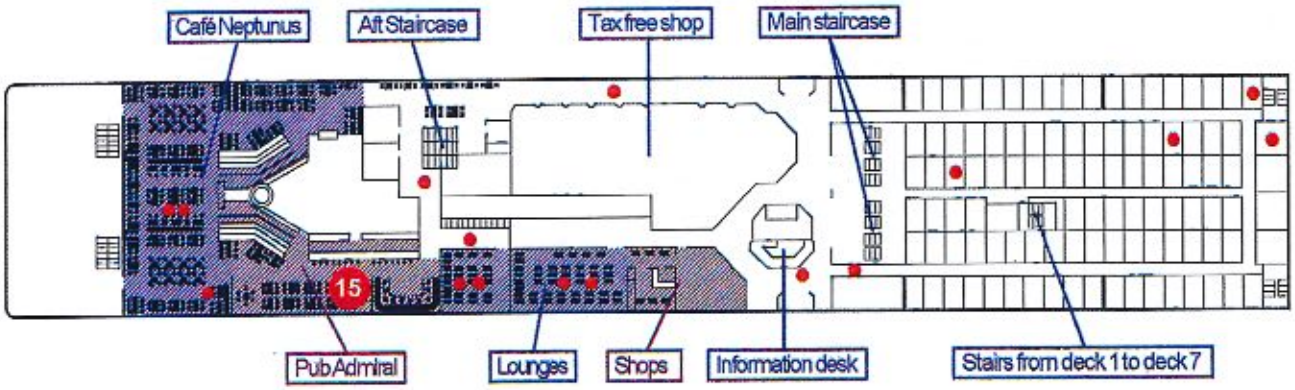


Figure 6.5 Café Neptunus, port side looking aft.

Figure 6.6 Aft staircase and the port side arcade looking foward on deck 5.

or that the sound and vibrations from the engines changed, after the first heel. Others, also from various locations, have said that the engines were running as before.

One witness managed to leave his cabin after the heel, by moving all loose objects into the lavatory, thereby getting the cabin door free so that he was able to open it. He stated that the sounds from the engine were normal.

In another forward cabin a man and his wife were awakened by a sound as of large sheets of metal beating together. Soon after this, the ship developed a list. The couple, in their night clothes, rushed out into the corridor. They noticed others leaving their cabins, some running back and forth and others falling and crawling. The list increased by jerks and somewhere along their way out, the wife lost sight of her husband.

Reports from the lounges

In the lounges 10 to 15 people were sleeping and resting. All were awakened by a scraping sound and by the ship's list. Some seemed to be apathetic and bewildered but others shouted to the rest that they must get out quickly. Only a few responded.

Four passengers ran out directly to the starboard arcade and saw many people in the area around the shops and the information desk. Near the information desk and the main staircases there were two female crew members who did not seem to know what was happening or what to do. People were trying to reach the forward main staircases to go up, but the list made it difficult to move in the arcade as did the crowd further forward. There was much screaming among those fleeing. In the crowd in the open forward hall many passengers failed to reach any of the four staircases going up. Several passengers were lying down and others falling or sliding along the floor and hitting the bulkhead. Several appeared to be injured.

Reports from the Café Neptunus

There were six or seven people in the Café Neptunus (Figure 6.5). Most were resting or sleeping. One witness was sitting, resting his head against the bulkhead and he felt and heard a heavy metal blow to the hull, apparently from the bow. Soon afterwards, the ship heeled over. Another witness said that 5 to 7 minutes later, furniture and cutlery racks, glasses and china fell to the floor and slid with a loud noise to starboard, waking those present. Two passengers slid into the bulkhead. Some passengers were sitting perfectly still, seemingly petrified and horrified.

The alarm *Mr Skylight to number one and two* was heard from the public address system just after the heel and while one of the witnesses was moving towards the aft doors out to the open aft deck.

A few witnesses lay down on the floor and started to drag themselves up to the doors using the tables which were fixed to the floor. One witness, who was together with his mother, took off his shoes and socks and dragged himself from one table to another, helping his mother by pulling her across the floor table by table. They had to move upwards towards the centre line of the ship and then another 10 metres aft to reach a door. He pulled his mother four or five tables. She had to rest for a while. When the list had increased and he was standing on the pillar of a fixed table trying to pull her further aft, she was exhausted. Clinging to a pillar, two tables from the port doors, she begged him to leave her and continue by himself. She told him that she didn't have any more strength. He shouted at her in vain to continue. At this time, water was coming in from the outside to where they had been sitting earlier, and pictures on the wall appeared to be hanging at a 45-degree angle. This witness managed to drag himself out to the open aft deck and by use of both stairs and rails, he hauled himself further up and eventually to the port side of the hull.

Reports from the open areas

In the open space aft and in the arcades near the information desk and shops quite a few passengers were moving around or sitting in chairs. One witness said that the ship was moving heavily in the storm, making balance difficult. Intuitively he felt a slight list. Suddenly the ship shook and a few moments later heeled over. This heel was very sudden and increased. Passengers and loose objects started to move and tumble around. The witness reported how passengers were thrown violently against the starboard bulkhead and injured. He fell too, but without hurting himself much. The heel caused immediate panic among the crowd and people were running in all directions.

Another witness said that the ship heeled over and remained with a list of about 15 degrees. Ten seconds later a new heel came, which was immediately followed by another. After the three heels the ship had a list of about 45 degrees.

People escaping from deck 1 were coming up the main staircase to deck 5 and the foyer at the information desk. A few witnesses had heard a ringing sound from below on their way up. They had passed several others who were too exhausted to continue climbing. In the main foyer a female crew member slid violently across the floor, screaming loudly. When she hit the wall she became silent. Shortly afterwards, another woman slid the same way. One witness did not dare to look any more but gripped the handrails and pulled himself upwards. It was increasingly difficult to climb the staircase and people had to cling to the handrails. More people were coming all the time and many crowded near the main staircase next to the information area, making it difficult to pass and also hard to hold on to the handrails.

When passing deck 5, witnesses saw a row of gambling machines falling down on people, but no one was able to do anything to help because if they released their grip they would be lost as well.

Reports from the Pub Admiral

Witnesses put the numbers of people in the Pub Admiral at between 30 and 60. Some were sitting at the bar, some in sofas and others at tables. An entertainer on a small stage was leading a karaoke

competition and conducting sing-alongs. Witnesses reported that during the show, the ESTONIA's motion increased and that some glasses hanging over the bar counter fell to the floor, as well as some from the tables. The staff started to clear away glasses and bottles from the bar. It was hard for those who were standing and walking to keep their balance.

The entertainer was scheduled to end his show at 0100 hrs but said approximately five minutes before the hour that he would continue for another fifteen or twenty minutes because they were having such fun. Soon after his announcement there was a heavy noise; one witness estimated the time to be around 0115 hrs. It felt as if the ship had hit a big wave. Another witness said that he heard a heavy metallic blow above the noise and the music in the pub, the sound seeming to come from forward.

The metallic blow was not like that of a sledgehammer, but gave a huge, distinct metallic noise, like a shot, reverberating through the hull. It was followed by a slight list.

A few people in the pub commented on the sound, with remarks such as "now we've hit an iceberg", but most passengers paid no attention. Because of the bang, one witness wanted to leave the bar, but others in his company told him to stay and wait.

Half a minute or a minute after the first blow, there was another, similar blow and the ship started rolling instead of pitching as before. After a short time she moved in different directions and then heeled to starboard. Some witnesses reported that the ship rolled over to starboard three to four times, then back again but not entirely, i.e. rolled further to starboard every time. After the fourth heel she remained in a distinct list.

One witness stated that after the uncontrolled movements in all directions, the ESTONIA started to roll more and more in all directions and finally only sideways, followed by a moderate heel. Some glasses fell to the floor and a karaoke monitor on wheels started moving. Ten seconds after the first heel there was another one and this time all loose objects started moving. The ship stabilised in a 30-degree list, as stated by several witnesses, and was still rolling somewhat. According to one witness, she kept this angle for about 5 to 6 minutes.

The bar counter ran along the bulkhead to port near the pub entrance facing starboard. When the ESTONIA heeled over the second or third time, all glasses and bottles fell on top of the female bartender, and the refrigerators behind the bar counter came loose. The bartender, who tried to brace herself against the bar, screamed loudly and was knocked down and injured by the falling objects. The guests sitting at the bar had to hold on and some stools slid away from them. There was immediate panic in the pub: several guests screamed while others seemed to be paralysed, staring and horrified.

At the third or fourth heel, almost everyone fell to the floor and slid violently, together with loose objects, into the starboard bulkhead where a large pile of passengers and objects was building up. Most passengers were trying to reach the exit and when some of them were on their way up, the bar counter came loose. A few jumped up on sofas, thereby managing to avoid being hit. People struggled for the door and several female passengers hung onto each other's legs to form a human chain. A few took a running start upwards and some managed to get a grip on the door-post.

Outside the pub, more passengers formed a human chain to help and pull each other up to the handrail of the staircase in the aft hall.

Many, both inside and outside the pub, appeared paralysed, just holding on to whatever they could. Escaping passengers had to pull loose the hands of those who were paralysed with fear and shout directly in their ears not to block the way but to run up to deck 7 and save themselves.

6.3.5 Reports from deck 6

On deck 6 there was a forward cabin department with 103 cabins and 212 beds, almost identical with the other forward cabin departments. Amidships there was a hall with the main staircase. Further aft was the Baltic Bar with the casino on the port side and a stage amidships. On the starboard side amidships was also the Restaurant Seaside which was closed at the time of the accident. Further aft was the aft hall with staircases and, at the stern, the Restaurant Poseidon, also closed. At the stern there was a small afterdeck with two outside staircases starboard and port connecting the afterdecks on decks 4 to 7.

During the evening the band, which was playing in the Baltic Bar, finished their show early at 0030 hrs due to the heavy sea. They were scheduled to play until 0200 hrs. A dance team had difficulties performing their show and dancers had fallen several times, as had music stands and other equipment.

From deck 6, sixteen people survived. At the time of the accident eleven survivors were in their cabins, one in the Baltic Bar, three in the casino and one out on the aft deck. Figure 6.7 shows the plan of deck 6 and the locations of the survivors.

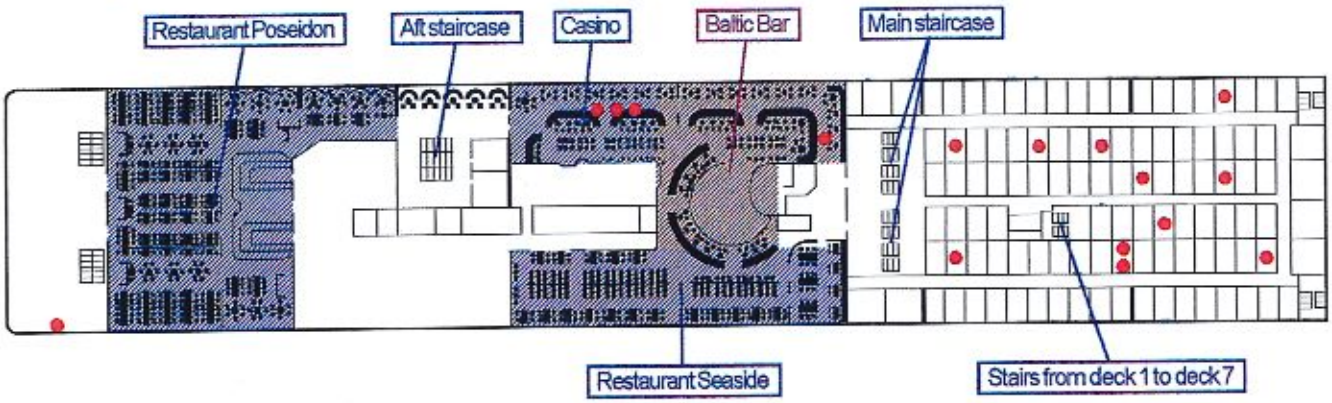
Reports from the cabin department

In the cabin department most witnesses had gone to bed. One witness who went to her cabin just before 0100 hrs reported that 7 to 8 minutes later the ship heeled over. Another was awakened by the heavy movement. One sleeping witness was thrown out of bed due to the list.

One witness, in an aft starboard cabin, was awakened by the regular blows from the waves but noticed a vague trembling which deviated from the usual. A trembling and markedly thudding noise was repeated four times at short intervals, then a longer interval and then repeated again. The witness got out of bed and shortly afterwards the ship heeled over. Other witnesses in more forward cabins reported sounds resembling huge crashes and bangs just prior to the heeling.

The passengers ran out of their cabins and into the corridors. One witness had

Figure 6.7 Plan showing deck 6. Red dots mark all known locations of survivors at the onset of the accident.



to drag furniture and luggage into the lavatory to be able to open the blocked cabin door. Running along the corridor, this witness heard an alarm siren. People were screaming in cabins and corridors. Out in the open hall near the main staircases there were numerous flying objects and broken glass. This witness saw people lying on the starboard side of the stairway, some seemingly apathetic and others with injuries that may have included broken legs.

A few passengers who were heading for the port side forward staircase were seen sliding in the corridor across the ship, severely injuring themselves when they violently hit the starboard bulkhead.

Reports from the Baltic Bar

One witness from the Baltic Bar said that after 0030 hrs the ship's motion increased. Some time after 0100 hrs the ship raised her bow violently and dived deeply. After the second or third dive she behaved differently. The expected rising of the bow did not occur and the ship's movements felt more rigid. A few minutes later, she heeled over to starboard and glasses and other objects fell from the tables. This witness left his place for the staircases and while moving upwards he heard glasses crashing from the bar and several passengers screaming. On his way, this Swedish witness also heard some message, in a foreign language, over the public address system.

Reports from the casino

In the casino there were about four passengers and a croupier playing cards. One witness heard three or four heavy metallic blows one after the other. The sounds appeared to come from beneath. Moments later the ship heeled. Playing cards and gambling chips flew across the table. Seconds later, the ship trembled once more, the list increased, and the gambling table fell over and slid against a bulkhead. The players and the croupier moved out together, heading for deck 7.

The three witnesses from the casino reported that approximately five minutes after the heel they heard alarm signals: first the word "Häire" two or three times and immediately after that a man's voice announcing "Mr Skylight number one and number two".

In the main staircase there were many people and it was quite difficult to force one's way upwards. Many were moving upwards and some were also heading down. One witness from deck 1, passing deck 6 saw two crew members lying on each side of a corridor shouting in their walkie-talkies. As he passed them he said "lifeboats?" to them but got no answer.

Reports from the outer deck

One passenger was alone on the starboard side of the aft outer deck. To starboard he could see the lights from two other distant ships, one abaft and one abeam of the ESTONIA. He looked at his watch at 0105 hrs. According to his estimation, twenty minutes after, the ship suddenly listed without any forewarning. He saw through the windows into the restaurant that chairs and tables were shifting and down the staircase from deck 7 a barrel and a folding chair came tumbling. It was impossible to walk straight to the other side. With the help of the railing he dragged himself round the aft deck and up to the port side. There he put his head out and looked forward alongside the ship. The ship was now slowing down and turning to port, and he could see a part of the stabiliser fin over the water surface.

When the ship jerked over again he sat down on the deck and slid from the port side railing to the nearest stairs and climbed up to deck 7. During the climb he heard two different alarm messages over the public address system but was unable to understand them. Once up, he turned around and could see through the staircase opening on deck 7 that the place where he earlier stood on deck 6 now was level with the water.

From the staircase he had to jump in order to get a grip on the aft shield plate extension of the port bulkhead superstructure. He missed and slid down violently, but managed to get a grip somewhere round the staircase. He pulled himself up again and jumped for a new grip. Eventually he was able to raise himself and climb to the port side of the superstructure on deck 7.

6.3.6
Reports from deck 7

On deck 7 there were three cabin departments for the crew, one forward with 25 cabins, one amidships with 25 cabins and one aft with 29 cabins. The aft department also contained messrooms for officers and crew, and a pantry. Between the forward and the midship cabin departments was the hall with the main staircases and between the midship and aft cabin departments the aft staircase. In the forward cabin department, one door led out to open deck forward of the four aftmost cabins on the starboard side and from the aft staircase a transverse corridor led out to the starboard open deck.

From deck 7, 26 people were rescued, most of them crew members and entertainers but also two passengers. Twenty-two were in cabins, one out on starboard deck, one in the hall near the main staircase. One was in the main staircase between deck 6 and 7 and one in the forward port staircase. Figure 6.8 shows the plan of deck 7 and the locations of survivors.

Several crew members said that they had had a storm like this the preceding winter. A cook, who also recollected the previous storm, said that the heavy sea this time was exceptional and that he could not sleep.

One witness, a passenger, went together with his friend up to deck 7 at about 2300 hrs to find a place to sleep. He had slept in this place on several previous trips. They were in the forwardmost port staircase where two windows overlooked the bow area and a door on the port side led out to the open deck. They were lying on the landing in sleeping bags. At about 0000 hrs the witness felt a very heavy blow against the bow and got up to look through one of the forward windows.

The ship behaved as if she was jumping on the waves. The sea was violent. Farthest out on the bow a searchlight was on, shining within a 10-metre radius in the direction of the bow. The ship was pitching heavily and the water was almost up to bow level, sometimes submerging the searchlight. Much water was coming onto the deck and through the forecastle deck rail.

About two minutes after having seen how a large part of the forecastle deck was bouncing up and sinking, this witness looked at his watch which read 0028 hrs. A transverse opening at the head was seen, whence much water was gushing up. The cascades of water seemed to be heavier on the starboard side. At this moment the searchlight went out and the engines stopped. The witness and his friend started to dress and decided to leave. After the cascade from the transverse opening in the forecastle deck, the bow seemed to sink under the water. When they came to the open deck at the forward port side there were about 20 people supporting themselves against the bulkhead. The witness started to prepare a lifeboat for launching.

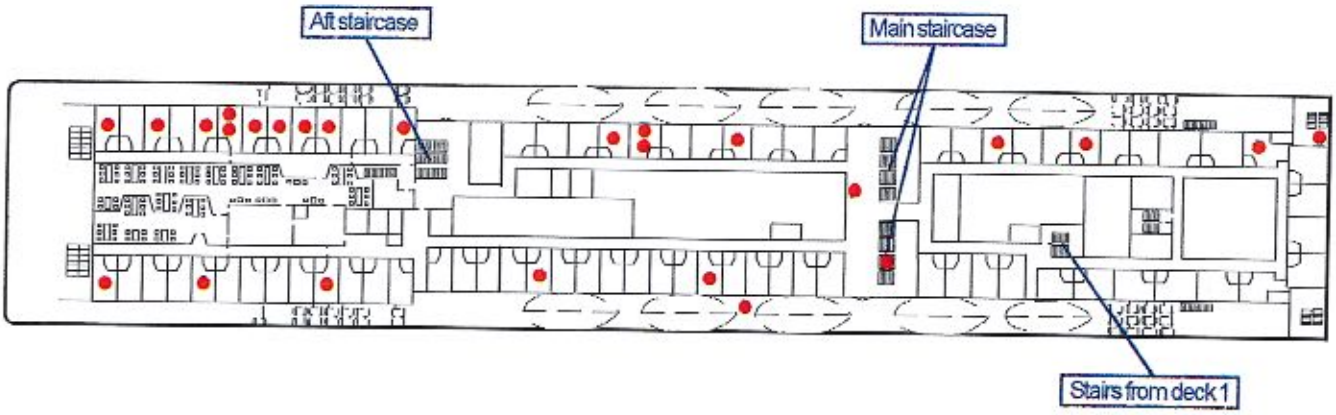
In a later hearing, this witness stated that he was no longer certain whether his watch was correct on the night of the accident. He had changed batteries the day before the journey and suspected that it might not have been set correctly on the night in question. He is also uncertain whether he actually saw the bow rise and sink or whether he concluded this from the transverse opening and the cascades of water which he had never seen before on any of his six previous journeys. His conclusion was based on the fact that the transverse opening grew larger and that the water cascading in through the opening increased.

Three to five minutes prior to the heel, a motorman, off duty and in his cabin, heard sounds like someone banging the hull with a huge hammer. The sounds seemed to come from the car deck and his first thought was that the cars were loose.

The second engineer was awakened in his cabin and stated that he heard beating, which he at first thought was coming from the lifeboats on deck 7. He also thought that the bow visor had come loose. He calmed down when the beating ceased and did not phone the bridge to report it.

The female witness who had left her

Figure 6.8 Plan showing deck 7. Red dots mark all known locations of survivors at the onset of the accident



friends in the cabin on deck 1 was sitting on a chair on deck 7 and reported that she heard a distinct bang when the ship heeled over and things tumbled. People slid downwards to starboard and could not get up again.

Most witnesses were awakened by the heel or by falling objects in their cabins. One woke up because his alarm clock fell. He gave the time as around 0110 hrs and stated that the list was then about 5–10 degrees. Another could not sleep due to the movements and was alarmed when objects fell to the floor.

A few witnesses stated that the ship's engines stopped and one witness said that the vibrations in the hull were ordinary, as if from the main engines running.

One of the entertainers felt that something was amiss and went out on deck on the starboard side. After a couple of minutes the ship suddenly heeled over and a woman came from inside and fell against the rail. She could not get back because of the list. He had to jump, and managed to grip on the loosely hanging door and pull himself and the woman inside.

Some witnesses ran out into the corridor where there were many crew members. There was panic, several people were holding on to the handrails, some were screaming and seemed hysterical. The storekeeper, together with his cabin mate, wanted to leave their cabin but waited for further orders because they realised the situation was abnormal. After waiting in vain for orders or alarm signals, they decided, when the list was 30 degrees, to leave the cabin through the window.

Two witnesses have reported that the ship had a steady 5-degree list for a few minutes and then suddenly developed a list of about 25 to 30 degrees. The time for this second heel, as stated by two crew members, was around 0120 hrs.

The second engineer opened his cabin door and saw the 1st engineer outside. According to the second engineer and a mechanic, the first engineer said: "Seems as if the bow visor has been thrown open; it would be a good thing if we got her beached". (The first engineer could overlook the forecastle area from his cabin.) The second engineer returned to his cabin for his torch and a radio. He then had to leave the cabin through the window. Several other crew members in port cabins were also escaping through windows.

In another cabin, two crew members could not escape through the window. Instead they jumped on the door, which now was in the position of the floor. The door broke and they tumbled down into the corridor.

On their way out, several crew members heard "Häire" twice and soon after *Mr Skylight to number one and two* over the loudspeakers. The second engineer heard on his walkie-talkie someone from the information desk trying to contact the bridge. He tried to help by using his own radio to call the bridge, but received no reply. Another crew member, a watchman, stated that besides the other alarm signals there was also an order to passengers and crew to get out and an order to release the lifeboats. (It is not clear whether this order was given over the public address system or in some other way.) Another witness, a shop assistant, has stated that sometime during the chain of events a male voice announced that the ship was sinking.

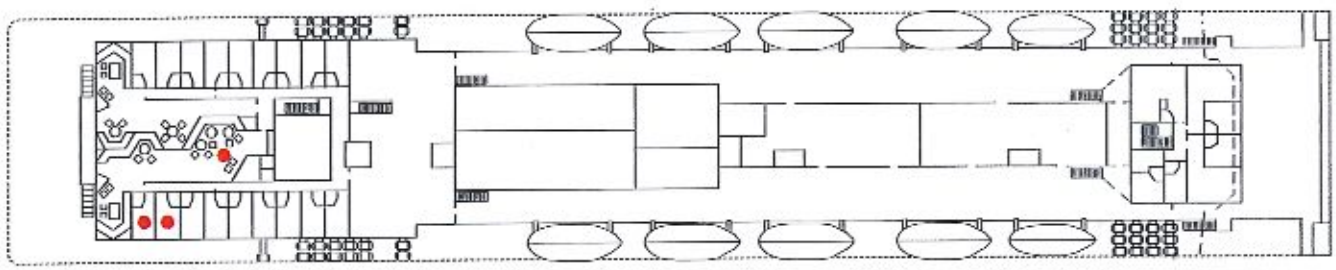
6.3.7
Reports from deck 8

Forward on deck 8 there were cabins for the master, the chief engineer, the owner, the radio officer; and the radio room. As these cabins were situated just below the bridge, a very short corridor connected them to the bridge staircase. Aft there were 18 cabins, 9 on each side, all for officers and crew. In between the rows of cabins there were messrooms.

From deck 8 four crew members survived. Two of them were in cabins, one in the messroom and one was in an undecided port cabin. Figure 6.9 shows the plan of deck 8 and the known locations of survivors.

A shop assistant could not sleep because she was afraid and seasick. When the ship heeled over she screamed as loud as she could. Screaming was also heard from other cabins. Another wit-

Figure 6.9 Plan showing deck 8. Red dots mark all known locations of survivors at the onset of the accident.



ness, a cabin attendant, was awakened by the beds shaking and by the screaming, another at 0110–0115 hrs by a cupboard falling. There were many panic-stricken crew members in the corridor. This witness had to walk along the bulkhead due to the list. One witness went into the messroom where two female shop assistants and a couple of men were looking out of the windows. All seemed to be panic-stricken. This witness returned to her cabin, together with a friend, and dressed. They left the cabin when the ship heeled over again, causing this witness to fall along the corridor and her friend to fall back into the cabin.

Four witnesses eventually managed to climb out on deck and down to deck 7. During the events they heard the alarm message "Häire, häire, laeval on häire" and *Mr Skylight to number one and two.* One of them interpreted the last alarm to mean that something had happened on decks one and two. One said that she could not hear any sound from the engines due to all the screaming.

6.3.8 Reports from uncertain locations

Three testimonies are by witnesses who were in their cabins at the time of the accident but the locations of these cabins have not been reported.

They report that there was a terrible thudding in addition to the more natural blows they heard at the beginning. Some time after 0100 hrs the first bump came, a strange bang, as though they were running aground, or a bang as from sheet metal or metal rubbing against metal.

6.3.9 Reports from the staircases

At the beginning, the first passengers did not experience any special difficulties climbing the various staircases. They reported only a slight list and there was no crowding. The list suddenly increased in jerks, however, and more and more people reached the staircases on different decks. Several witnesses reported the list to be about 30–35 degrees and only slowly increasing, and that the ship's rolling more or less ceased. People coming from cabin and public areas tried to climb up to deck 7 to reach the lifeboat deck.

The forward staircases

The forward port and starboard staircases were in the forward corners of the superstructure. Both led from deck 4 to deck 7 and on each deck there were doors to the respective cabin areas, as well as out to the open deck on deck 7. Halfway between each deck there were landings.

Reports from the forward port staircase

On the forward port staircase only a few passengers were climbing. Due to the list some were unable to reach this staircase because in each cabin department they had to pass a transverse corridor. One couple lost their balance, slid down a corridor towards the starboard bulkhead and hurt themselves. On this staircase there was no crowding but the list made it increasingly difficult to climb. An elderly couple lay on the landing between decks 6 and 7. Both were bleeding and they were passed by other passengers.

The staircase through the forward cabin departments

The six staircases from deck 1 joined to make three on deck 3. One of these three ran inside the forward cabin departments up to deck 7. This staircase was connected to the central corridors on each deck and was located somewhat to the starboard of the corridor.

Reports from the staircase through the forward cabin departments

Several people from deck 1 came up the staircase through the forward cabin department to deck 4. Some climbed further up to decks 5 and 6, others ran along the corridors forward and some aft towards the foyer. The passengers who were heading aft to the foyer on deck 4 met a person pointing forward in the corridor and saying in Swedish "Get back, death-trap, run forward". This person calmly spoke to those who were coming up the staircase. One witness, who together with 10 to 15 others was running forward, looked back and could see through the glazed doors into the foyer, with its yellow glazed tile flooring, how people were sliding on their backs to starboard.

The main staircase

The main staircase, going up from the entrance foyer, consisted of eight flights, four on the starboard side and four on the port, separated on each deck by the central corridors leading into the forward cabin areas.

On the deck levels, the two upward flights on either side of the corridor were adjacent between the downward flights. On the landing levels, this was reversed.

The main staircases began on deck 4, from where one narrow flight led down to the car decks and the cabin department on deck 1. From deck 4 they ascended to deck 7. From there and up to decks 8 and 9 there were separate staircases for crew only.

On deck 4 the staircases led directly into the entrance foyer, while on other decks they were separated by bulkheads from the public areas and halls. On these decks the bulkheads had an open front towards the halls. On deck 7 the staircase was entirely separated from other areas by bulkheads with fire doors, one forward and two aft, leading to the crew's cabin areas. To port and starboard there were glazed double doors with a central pillar, leading out to the open deck.

The railings of the main staircase were made of five parallel aluminium tubes with a thicker tube as a handrail on top. The railings followed the profile of the staircase, being fixed to the floor and to every fourth step by vertical flat steel at approximately one-metre intervals. All eight flights had railings on both sides.

Reports from the main staircase

On deck 4 many people were trying to reach the staircase. Many stood along the walls and part-way up the stairs. People were having growing difficulties climbing because of the increasing list. Some stood still, just holding on while others reached the handrails and tried to pull themselves upwards. Several were half-dressed and many were drunk. One witness saw her husband lose his grip and fall down the staircase where another, quite heavy, female passenger slid down on top of him. Several witnesses escaped by dragging themselves up along the handrails. On most of the landings there were people lying and sitting. Witnesses saw others in need of help but they could scarcely help others because they could hardly help themselves.

One witness said that he felt trapped, with many people behind him and many in front, some of them not moving at all. Another witness on his way up saw many people in a state of panic. Some were only sitting in corners, incapable of doing anything. On deck 4 this witness saw some crew members trying to guide passengers. Another witness said that during his climb he passed many people who were screaming and crying and that several were in panic. The climbing was difficult in parts of the staircases where carpets had come loose and slid away. Many people hung onto handrails, which also broke, causing several to slide down and many to panic.

Most of those trying to make it up to deck 7 were moving upwards, but quite a few were standing still. One witness said that he had to wait between decks 4 and 5 for about five minutes due to the crowd. A woman's voice shouted "out, out". While waiting, he heard the "Häire, häire, laeval on häire" call from the public address system. The ship's list increased in jerks and there were many people and total chaos on deck 6. A vending machine slid down the foyer. Later on, a witness saw an officer wearing a white shirt and shoulder straps with stripes of rank and a triangle. He had a walkie-talkie. On the landing between decks 6 and 7, many people were lying and standing. Those who were climbing could also see many people in various corridors lying all over the place.

Quite a few on the crowded staircase lacked the strength to continue. By the time some reached deck 7, the ship had a list of about 35–40 degrees. The lights were still on. On the deck there were plenty of lifejackets and at the open doors a crew member was trying to lead people out. People formed a human chain, helping each other out to the port side of the deck. One witness said that the chain was mostly made up of crew members. Crew members also told passengers outside to move on and not to block the open doors. A few witnesses saw a crew member with a walkie-talkie and a "scooter uniform" out on deck while other witnesses reported having seen no organised action by the crew.

One witness who came up early to the main hall on deck 7 saw one or two crew members with walkie-talkies. While outside distributing lifejackets, he heard the bell ringing. Another witness who arrived quite early reported that there were four or five people whom he thought were crew members. They were keeping passengers back. This Russian-speaking witness did not understand their language and was therefore not able to tell whether they were giving instructions to the passengers. Another witness reported that on the port side of the main staircase, one crew member had braced himself somehow and was helping people from the staircases to the open port doors by pulling them upwards.

Up in the hall on deck 7 people had to hang on to handrails and drag themselves up to the doors. One witness saw people sliding down the hall on the carpeted deck. She saw one woman hit the door on the other side violently, losing consciousness. This witness managed to hold on to the handrail despite the many people forcing their way forwards. In some places the handrail had come loose, making it difficult to climb up to deck 7. People were coming out through the glass doors one by one and the witness had to wait her turn. It was impossible to get out without holding on to the door or something else.

One passenger from deck 1 who arrived early on deck 7 said that it looked as if the open doors were standing straight up. On coming out he saw 5–6 persons on the outside deck. Another witness violently forced his way up and through the doors, pressing someone else out at the same time. To be able to get out, one witness said some had to pull and others had to push from behind. This witness also said that people who reached the deck 7 level seemed to be acting more constructively than others. Another witness saw, on arriving on deck 7, that the opposite side of the ship was already level with the water line.

A male witness threw himself at the door, trying to grasp the central pillar but failed and slid down. Somebody threw lifejackets to him but he managed to force himself up once again to grasp the pillar. This time he managed to hang on and push out five more people. By now there were many people out on deck. Another witness said that he grasped a handrail and reached deck 7. This witness also said that the crew appeared bewildered and did not seem to know what to do.

A few witnesses reported hearing alarm signals such as a bell ringing and public address system messages such as *Mr Skylight to number one and two* and "Häire, häire, laeval on häire". Some were not able to distinguish what messages they heard and others stated that they could not possibly hear alarms due to the screaming. One witness said that he heard rushing water from below the staircase and that there was water in the staircase.

The aft staircase

The aft staircase was situated to port of the ship's centre line. It consisted of three parallel flights with landings between every deck (Figure 6.6). It went from deck 4 up to deck 7 where, to port, glass double doors led to the open deck.

The railings of this staircase were

similar to those of the main staircase.

This staircase connected the public areas such as the conference department on deck 4, the lounges, the Pub Admiral and the Cafe Neptunus on deck 5, and the Restaurant Poseidon and the casino on deck 6. On deck 4, access from the midship cabin department was through all three longitudinal corridors, which had doors leading to this staircase.

Reports from the aft staircase

On the aft staircase there were also many people, mostly from the Pub Admiral, the lounges, the casino and the Cafe Neptunus, i.e. from decks 5 and 6.

One early witness had no difficulties climbing to deck 7. He looked inside corridors when passing and stated that they were completely empty of people.

People climbed by shuffling their hands up along the handrail. If one hand was released it resulted in a fall. Several people were falling down, hitting the lower landing. Only the strongest were able to struggle further up.

One witness reported seeing a crew member trying to arrange a human chain to help passengers up from lower parts of the ship. People were shouting to each other to run up to deck 7 and get out.

The aft outdoor stairs

Aft of the ship's superstructure there were rather small open-air decks with two staircases, one on each side. They went from deck 4 to deck 8 and could be reached only from the inside public areas through doors on decks 4, 5 and 6 and through the crew areas on decks 7 and 8.

Reports from the aft outdoor stairs

Two survivors, who were able to reach the afterdeck after quite some time, reported heavy wind and waves. While struggling to reach the aft port side door, one of these witnesses reported that the lights went off first momentarily and then for good when he reached the outer deck. Once out on deck he threw himself at some fixed tables. From these tables he managed to get hold of the iron handrails on the port side staircase. He was not able to climb the stairs due to the heavy list but tried to climb along the handrail. Waves lifted him and moved him upwards metre by metre. In this manner he eventually reached deck 6 where he came under water and had to swim for an open area in between the decks. Eventually he reached the surface but without a lifejacket on. At some time during his climb he saw a man passively standing on the inside of the closed half-glazed doors, presumably unable to open them because they were already partly under water.

The other witness from this staircase looked for lifejackets out on deck but could not find any. This witness managed to climb from the port side of the afterdeck on deck 5 straight up onto the hull when the list was about 90 degrees.

6.3.10 Reports from the open deck, deck 7

The first passengers out did not experience any crowding on staircases and outside. One of the first passengers out on deck 7 reported that he saw one or two crew members coming into the hall on deck 7 at the same time. The list at this time was estimated by this witness to be around 30 degrees. Helped by another passenger, he managed to open the doors out. While doing this he noticed that more people were coming up the staircases after him. This witness came out as the first or second person and immediately opened a nearby lifejacket container. He saw more people coming out and he distributed lifejackets both forward and aft. He could not keep up with all the people coming so he shouted to others, and got help.

Another witness moved up through the staircases without noticing any crowding but he found it difficult to get out due to the increasing list. This witness helped an officer out through the doors and the officer, once out on deck, started throwing lifejackets down into the hall and staircase. Out on deck, the lights were on and the moon was shining. Under the bridge was a small crowd and they were quite calm. There were 8–10 people outside when one witness noticed the time by her watch as 0105 hrs. People started to put on lifejackets and passed lifejackets from hand to hand. More people were coming out all the time. Several people threw lifejackets down into the ship to others still climbing in the staircase and the open hall.

Another passenger said that when he came out there were about 20 people as well as "groups of drunken youngsters". Some passengers said there was panic while others said there was no panic. On deck, several people heard the "Häire" announcement from the loudspeakers. One witness saw around ten persons lying on the deck near the bulkhead. They seemed apathetic and he threw lifejackets to them. He did not see them react or put on the lifejackets. Most passengers out on deck were in their underwear with lifejackets on. There was heavy spray and much water was coming down the main hall. Out on deck there was much activity, most people trying to do something. The ship was rolling and jerking.

More and more people emerged to deck 7 and a large crowd grew just outside the open doors. People helped each other out and some had to tell others to move away from the doors to make way for those still inside on the staircase. One female witness saw three men from the crew, and her impression was that they were behaving like any passenger, although they were helping others out. She also tried to get help from another crew member to release the lifeboats, but she found him even more passive than most of the passengers.

Several witnesses reported that they tried to open the liferaft containers. One unfastened the rubber strap around the container and pulled the handle to open the lid but this broke into pieces. He found the containers impossible to open.

At one point a human chain was formed where people tried to pull each other out. One crew member in a white shirt and tie was seen in the chain. At

another point some people were lying down on the deck pulling others out.

Several witnesses reported that there were many panicking people on deck and that, "everyone was only looking out for him- or herself". There was screaming, crying and full panic, and people were treading on each other. Some passengers were injured, lying down and shouting for lifejackets. One woman was on all fours screaming and begging for a lifejacket. Someone threw one in her direction but it was uncertain whether she managed to put it on.

Several seemingly apathetic passengers were sitting on deck with their feet up and their backs against the bulkhead. Two men near the lifeboats were desperately pulling and tearing at ropes while others were coming out from the staircase. One of these fell on the threshold but managed to get hold of the railing. A number of crew members pulled and dragged more people out. On deck, people dispersed, some moving forward and others moving amidships and aft.

One witness trying to reach the port door, slid across the hall and through an open door out to starboard. He saw a couple of elderly people lying outside, seemingly dead. He opened a locker to a lifejacket container and started giving out lifejackets to the few people nearby. Soon he had to hold firmly onto the railing so as not to slide into the water, the surface now being quite near him. He was right under lifeboat number 5 when he saw lifeboat number 7 washed loose by a wave. At the same moment two lifejacket containers also came loose and tumbled into the sea. He and a female bartender were standing together, holding on to the railing, and were washed over by waves several times, sometimes being completely under water. Suddenly lifeboat number 5 came loose and in the next wave the bartender disappeared. The following wave washed the witness into the sea.

On the open deck to port there was much activity. Several people were distributing lifejackets from containers, others were throwing them into the staircase or passing them on to other passengers on the deck. Two passengers tried to release a lifeboat and others started to climb onto the liferaft containers. Two men tried to loosen these containers and others tried to open them by hand. One container broke loose and fell into the sea. While this was happening, the lights went out several times. Every time the light went out it was accompanied by screams. The passengers who were working to release the lifeboats found a panel with buttons of various colours. They tried to press all the buttons but nothing happened. They could not find any instructions. There was also a manual winch but three passengers together were not able to move it. They went on trying to open liferaft containers. They managed to open one and the raft inflated.

Around the same time there were about 100 people on the open decks. Some were passing lifejackets from hand to hand and people were trying to put the jackets on as best they could.

Out on deck a member of the crew talked calmly to the others and together with other crew members tried unsuccessfully to release a lifeboat. He said that the lashings were too rusty and that it was impossible to release this lifeboat. Another witness reported seeing a man standing, composed and assured, trying to calm those who were frightened. He arranged a human chain to distribute lifejackets from an open container. He saw to that everyone got a lifejacket and also instructed and helped passengers to put them on. One woman lent her knife to a passenger who was trying to open liferaft containers, but he failed.

Several crew members have reported that other crew members worked to release liferafts which, however, once inflated, were blown from the deck and into the water. Other crew members secured liferafts with ropes to the railings. One passenger managed to release a couple of liferaft containers which fell into the water and the rafts started to inflate.

On the deck there were, according to several witnesses, a couple of able-bodied seamen, the security guard, a manager from the Stockholm terminal, a few storekeepers and the boatswain. The boatswain was seen doing a heroic job helping many passengers and releasing rafts. A storekeeper was reported to have taken charge of some rescue operations. Crew members distributed lifejackets or released liferafts both amidships and aft.

The master of the alternate crew was also seen forward on the deck, just under the bridge, distributing lifejackets and giving orders to other crew members and passengers. The trainee second officer and the AB seaman of the watch were also there at an early stage and, according to other crew member witnesses, did a great job in helping others. Other crew members have reported that the crew played no particular role in the evacuation. Several passengers have reported the same.

When the ship was listing about 30 degrees, the "Häire, häire, laeval on häire" announcement was heard out on deck. At this time the engines were still running and the floodlights and ordinary lights were on. Some witnesses said that they could not hear any sound from the engines due to the screaming.

From inside the staircase, people were heard screaming, crying and shouting for more lifejackets. Many lifejackets were blown into the sea by the strong wind, but there were also plenty lying on the deck. One witness said that most people were calm and queuing for jackets but most stated that there was panic and chaos. Some people reassured each other that this ship could not sink, and this calmed a few passengers somewhat. Later about 250 people were out on deck with lifejackets on, most of them not dressed, some only in underwear and some naked. One witness reported that many people came out during the first five to ten minutes. After that it was impossible because of the increasing list. One of the last who tried to come out, a woman, was seen lying in the staircase hanging on to the threshold. She could not pull herself out and, after a while, she lost her grip and slid back.

Somewhat later the master of the alternate crew was seen near the door to

the aft staircase coming from the fore and shouting orders and helping people. He ordered the safety guard to help two women release a liferaft. The security guard did not see, however, if the master got a lifejacket.

A few people started to climb up to deck 8 and formed a human chain to help more people up. Some ten people were on this deck trying to find lifejackets. After some difficulties, some of them managed to open one container and started distributing jackets. Some witnesses found the containers impossible to open due to the list. More people reached deck 8 and several fought for jackets, some trying to tear lifejackets from others even though there were plenty of jackets lying on deck. One witness reported that others told the fighters to calm down.

As the list increased, the hard plastic deck covering started breaking apart. Later this flooring broke free, preventing people from moving; and in some places it slid and rolled away. This covering also lay against the open aft doors, and later it fell into the sea on top of people in the water. More and more people grabbed the railings and hauled themselves up, afraid of being trapped below them when the ship's list increased. Some passengers helped lift others to get a grip on the railings, while others tried to jump up, but the railings were beyond the reach of many. According to one witness the ship had a list of 35 to 40 degrees for about ten minutes. Other witnesses reported that the ship suddenly heeled to 45 degrees, at about which point the engines stopped. Other witnesses stated that there were two distinct heels one to about 20 degrees and one to 45.

After lying at a 45-degree angle, according to some for about 5 minutes while the lights blinked a few times, the ship started to heel over again to 80 degrees and began to sink by the stern. At this time there were some very loud crashes from the inside and a loud hissing noise as air was expelled.

To starboard, one witness saw how people were clinging to the railing and were washed away when this became submerged. He also reported that he could see water rushing into the ship.

More and more people climbed up and out onto the ship's port side. Of the approximately 250 people, about 100 were sitting on the hull and holding on to the railing. Others who were not able to reach the railing stood on the bulkhead. Some jumped into the sea and many were forced off the ship by huge waves. Some witnesses held on, in spite of the seas, waiting for the right moment and a wave big enough to wash them safely over the ship's superstructure. They were afraid of being trapped or injured by railings, wires, lifeboats or davits. Some crew members and passengers together released a ladder which got stuck at the fender. One passenger, seen entering a lifeboat that was in its davits, lay down inside making no effort to launch it. Another passenger was seen losing his grip and sliding in right through the staircase hall and into the water on the starboard side.

A few people slid away on the ship's hull. Some were washed into the water but others were halted at the fender or got a grip on the ladder.

Several passengers reported that, as the Estonia's list reached 80 degrees, two crew members emerged from a shaft near the funnel shouting that there was water on the car deck. (They were presumably the system engineer and the motorman escaping from the engine room.) As the ship heeled, the lights went out, but soon the emergency light came on for four to five minutes then it was completely dark. A few witnesses also reported hearing a message on the public address system as the list reached 90 degrees. Two Estonian-speaking witnesses heard the message "the ship is going down" in Estonian. Another stated that he heard crew members urging passengers in Estonian to leave the sinking ship. When the funnel reached the water, witnesses could hear the bridge windows breaking. They also heard a long-drawn-out typhoon signal. They saw the firing of a distress rocket. At this angle, diesel oil started to flow over the ship, rendering surfaces rather slippery.

Out on the hull many people were now sitting, crawling, walking and standing. One passenger sat on a window holding onto a grating. Another trod on a window which broke injuring the person's leg. The moonlight and the white hull of the ship gave enough light to see what was happening. One witness has reported that the ship's hull was billowing and this made him afraid that the ship would break apart.

Several witnesses hung onto the rail but could not haul themselves up to climb onto the hull. One of them standing on the bulkhead was stuck just under a rack of liferaft containers. He ran aft on the bulkhead where he saw numbers of people crowding around a liferaft. Several climbed into it and under the tarpaulin canopy. Others were just hanging on to it, yet others throwing themselves onto its canopy. People were arguing about what to do and several thought it was too dangerous to launch the raft just at that moment. When the ship's angle seemed favourable they started to pull the raft, which slid into the wind alongside the hull. Soon after they were washed into the water together with the raft.

Some people worked in vain to open other liferaft containers but had to give up and run. About 15 people, forward on the hull, jumped into another liferaft which, after some sliding, got stuck against the rail. One witness shouted to the others to get out and help launch it and after a while everyone was out. They tried briefly but were unable to launch the raft. All of those who had been in the raft jumped into the water.

One man was seen climbing on the liferaft container racks, systematically opening containers one after another. One witness said it was the trainee second officer. The rafts inflated and many blew away. Others were caught by passengers and dragged over the hull towards the fender. Most of the liferafts were on the aft part of the hull.

One raft, forward, slid down on the hull towards the keel and got stuck on the fender. About 20 people were in the

raft, some under the canopy and some above, and after a short while, when the ship's funnel reached the water, this raft slid back over the rail and into the water now covering parts of the superstructure.

There was another liferaft on the hull with several people in it, some trying to pull it into the sea. The raft started to slide and, hitting the water, it turned over and most of the people fell off.

Several people were reported to have been standing on the almost horizontal bulkhead with their backs against the deck, watching the funnel sink into the water. When the funnel reached the water surface, they were all engulfed in pungent smoke spreading over the deck. One passenger on the bulkhead reported that heavy waves pressed him against the deck and that he had nowhere to escape. He decided to let go when the next wave came because he was afraid of getting caught by the rail. When the next big wave came he threw himself forward into the water where he had seen the funnel disappear.

Far aft on the hull another inflatable liferaft lay upside-down. On the bottom were about ten people, around it was a crowd and many others were running to it. Most jumped into the raft at the same time causing some chaos. One passenger rushed along the hull towards the raft and threw himself violently past the rest and into it. Shortly thereafter this raft with people on and outside, began to slide along the hull and into the water.

On the hull a man, wearing underpants only, was seen rushing aft. He pulled a lifejacket over his head and threw himself directly into the water. Another witness was washed into the sea after having seen people fighting for a liferaft. One man was together with his wife who was very afraid of the water. He jumped and waved and shouted to her to follow, but she did not do so.

Some 50 people moved towards the highest level of the hull near the bilge-keel where a stabiliser fin stood straight up, rocking back and forth. The list was now gradually increasing, but not faster than people were able to crawl or walk towards the bottom. At about this moment one passenger asked some crew members if this was the time to abandon ship and jump into the sea. They answered that it was not yet necessary.

When the list was about 135 degrees several lifeboats broke loose and were thrown violently against the ship and got damaged. Damaged lifeboats floated upside down and one splintered lifeboat floated back and forth in the waves, striking the ship hard. Some people slipped into the water among cranes, wires and lifeboats and one witness reported that it was terrible to see.

Most remaining people were now on the bottom of the ship and many slid into the water. According to one witness it was as if the water was coming up to fetch the people, a couple at a time, and drag them down. Around the ESTONIA there were many inflated liferafts. Aft there were more than ten, some of them upside down, others with the canopy up and with lights. All around the ship the water was full of floating empty lifejackets.

About ten people were left on the bottom of the hull when the ship turned nearly upside down. Most of them were washed into the sea and one of the last sitting near the bilge-keel, saw the stern sinking quite rapidly and liferafts floating around the stern. The ship had heeled against the wind. A wave from stern swept this witness into the water. By 01.30 hrs the stern was under water and the bow was rising, according to the trainee second officer who looked at his watch as he slid off the ship.

6.3.11
Reports from witnesses in the water

As the ESTONIA sank, many liferafts floated up to the surface. Numerous lifejackets floated around the vessel and also many liferafts. Several lifeboats floated upside down and witnesses also reported seeing dead people floating face down. Around and between liferafts were also people with lifejackets on, floating and swimming. Many screams and calls for help, including children's voices, were heard all around the rafts.

A few witnesses have reported seeing the ESTONIA sink. She went down, upside down, stern first, with the fore up in the air, clearly visible at a 45-degree angle. Part of the bridge was visible, the bulbous bow being the highest point. The ship maintained this position for several minutes and then gradually turned and sank into a sea of bubbles. Several people clinging to the ship followed her down. Two witnesses in liferafts saw people still climbing and clinging to the ship's bottom or hanging onto the rail. One witness saw several people climbing on the rail which broke and they all fell into the water. Another witness stated that he could see the ship sinking but with no people visible. There was much screaming at the moment she sank, but then a sudden silence. One witness reported that the ship was illuminated as she sank, and presumed it was the moonlight.

6.3.12
Reports from witnesses in various floating devices

From the witness testimonies it has been possible to identify many of those who were rescued from the same liferafts or lifeboats. Some witness reports include names of those they spent time with in the rafts while others do not. It has been possible, however, to trace many of the witnesses and identify the various floating devices by similarities in the reports. This cannot, however, be done with certainty in all cases.

Note also that all information in this summary, as well as in the other parts of this chapter, is derived exclusively from witnesses' testimonies. The number of people on board various floating devices and details about the rescue may therefore not necessarily correspond with the reports from helicopter and vessel crews involved in the rescue operations.

Reports from liferafts

Liferaft "A"

One male passenger, wearing a lifejacket, was swept from the hull into the sea. After being deep under water, he reached the surface and got hold of one more lifejacket. He found and clung firmly to some ropes from a lifebuoy. While hanging on, he heard someone close to him calling out for help in English. He got hold of the collar of a man in the water and saw that the man had no lifejacket. Suddenly a wave broke over them and the man was swept away. This witness later swam to a liferaft and managed to get in. The raft was full of water and the canopy was not raised. There were no other people in the raft. He managed to raise the canopy and the lights in the raft came on. After a while he found a suit made of aluminium foil. He tried to dress but the suit was too thin and tore, becoming useless. For several hours, water entered constantly because he was not able to close the canopy opening. During the early hours of the morning he was rescued by a Finnish helicopter.

Liferaft "B"

Two male passengers were rescued from another liferaft. One of them crawled along the ship's hull towards a raft which slid into the water. The witness held on to a rope and slid together with the raft into the water. He ended up quite close to another raft and managed to hang on to it. A young woman from inside held his hand, trying to pull him into the raft, but neither of them had the strength and after a while he lost his grip. He sank very deep and on regaining the surface he was quite dazed. He was floating very close to the ship's bow when he saw another raft drifting towards him. He managed to climb into this empty raft.

The other person rescued from the same raft was in the water for about an hour, swimming and floating on hard plastic deck covering from the sun deck. Several occupied rafts passed him but no one on board was able to throw a rope in his direction. He was wearing four lifejackets and now and then collided with rafts. He swam towards a drifting raft, calling for help. He saw a man who at first could not locate him in the dark. The man in the raft has reported that he heard calls for help and after a while he managed to get the swimmer on board.

They sat on top of the canopy at first but were able to crawl into the raft after a while. They also managed to raise the canopy and close the openings. There was a light in the raft. They helped each other to bail out the water with a plastic bailer and after a while they found a plastic bag containing another bailer and a hand torch. They were, however, unable to open this bag because their hands were frozen. One of them tried in vain to open it with his mouth but had to give up after losing some teeth. At about 0700 hrs these two men were rescued by a helicopter.

Liferaft "C"

One female passenger fell, hitting her head on something, and sank deep in the water. She thought she was going to die so she inhaled water. She eventually rose to the surface where she could see the ESTONIA and people clinging on. She collected several lifejackets from around her and floated on them towards a raft. She had difficulties getting on it and a young man from inside reached out to her. It took some time because she had tied herself to ropes, but the young man, an Estonian, held on and eventually pulled her up. In this raft there were six people some of whom were wearing overalls with "Estline" printed on them. Together they managed to release the canopy and got lights in the raft. From the water they heard screaming but were not able to see anyone.

After some time they fired distress rockets. Later they found a bag of plastic clothing, which they distributed to those who were nearly naked. From this raft six people were rescued by a Swedish helicopter.

Liferaft "D"

One passenger was thrown into the sea aft where the water smelled heavily of diesel oil. He swam to a raft that was upside down and a man helped him up. When on board he slid towards the centre of the raft where there was a large pool of water. He was exhausted and had to catch his breath. On the raft there were six persons. The raft turned over in the heavy seas and all on board fell into the water. This witness lost contact with the raft but hung on to a rope for several minutes, totally exhausted. He managed to get onto the raft again where there were still six people, one of them dead with severe head wounds. From this raft, five people were rescued at about 0700 hrs by a Finnish helicopter.

Liferaft "E"

In another raft there were two female crew members, (a mess attendant and a cabin attendant) together with a male passenger, all Estonians. The cabin attendant was inside the raft when it slid into the water. While in the water she managed to get hold of the man and pulled him on board. He had been swept off the ship by a wave. The mess attendant was also swept into the sea by a wave and surfaced close to this raft. The two inside helped her aboard and they were all rescued by a helicopter at about 0820 hrs.

Liferaft "F"

One passenger was swept overboard by a huge wave and after a short time in the water he managed to climb onto a liferaft which was upside down. He was alone and slid into the sea again because he realised that he could not survive in the open air. For protection against the cold wind he managed to get under the raft and inside the canopy. The raft was turned over by the heavy seas and he was suddenly inside the right way up. This raft was completely filled with water and he was constantly being washed over. He could not lie down or sit, only stand up. The raft suddenly turned over and he ended up beneath it again. The raft turned over in this manner several times during the night. One helicopter made two unsuccessful attempts to rescue him during

the early morning hours but had to give up. He was rescued by a Finnish Coast Guard vessel at about 0600 hrs.

Liferaft "G"

In another liferaft there were one male passenger and two dancers, one female and one male, all Estonians. The female dancer was rescued from the water by the other dancer and she was taken off by a Swedish helicopter at about 0330 hrs. Later the two men were rescued by a Finnish helicopter and brought to the SILJA SYMPHONY.

Liferaft "H"

One Estonian passenger slid along the ship's hull into the water and managed to get onto an empty liferaft. The canopy could not be raised and the waves washed over this passenger several times. He was rescued by a helicopter at about 0400 hrs.

Liferaft "I"

In one raft there were many people. Among these, 14 were identified through their witness testimonies. The identified passengers were one male Norwegian, two male Estonians, one male Latvian and six Swedes (five male and one female). The crew members were a male Estonian shop assistant, a Russian turner, a cook and a motorman. The motorman had a broken arm and head injuries.

One of the Swedish passengers jumped from the ESTONIA into the water and swam to get hold of a nearby raft. After being pulled up by others he was totally exhausted. At this time the canopy was not yet raised. The turner, who had slid into the water, got stuck between two rafts and boarded one of them containing only three other persons. After a while others hauled themselves into the raft. Some of the people near the openings pulled in several swimmers.

Five people rushed to a raft lying upside down aft on the hull of the ESTONIA. About 50 people were jumping into and clinging onto it. As the raft slid over the rail and into the water most people fell off. The female witness, a Swedish passenger, slid down together with the raft, holding on to the ropes. She went under and was caught by a rope around the foot. She struggled under water but eventually cut the rope with a knife and reached the surface, where she hung on to an overturned raft. Close to her a Swedish man was also hanging on, one of those who had slid with the raft. They floated together for about 30 minutes until the man managed to get hold of a drifting raft. This raft was full of people who helped them aboard.

Cascades of water entered the raft at every wave and it was already full of water. A few bailed and they managed to close the opening after about 45 minutes. They could hear people in the water calling for help but were unable to see from where because of the darkness and the big waves. Many of them could do nothing to help because they were too exhausted. A few struggled with a crew member over a hand torch. The crew member held desperately on to the torch. They eventually managed to loosen his grip and started signalling with it. The people in the raft tried to lie very close together to keep warm but they were moved around by the water inside and the heavy sea. Several people, crew members and passengers, were quite active and they also fired several distress rockets. One young Norwegian passenger made an especially heroic contribution.

After several hours (after daybreak), they were able to see the ISABELLA. The raft was drifting towards the ship which manoeuvred to intercept. On board the ISABELLA the crew had released a liferaft and three crew members in survival suits urged the drifters from the ESTONIA to move from their raft to the ISABELLA's which had a rope on top and could be hoisted on board. The ESTONIA's raft struck the ISABELLA's hull repeatedly but after a while one survivor after another started to haul themselves over to the ISABELLA's raft, which by this time was filling with water. ISABELLA crew members made several attempts to hoist the raft and the crew members in survival suits eventually jumped into the water so as to lessen the weight. After about ten attempts they managed to lift the raft, but the bottom split and all but one of those on board fell into the sea. One witness managed to hold on to the raft in spite of being stiff with cold and exhaustion. Several came under the raft and some disappeared in the water.

After some time the ISABELLA opened a port in the hull and released a slide. The people in the water and a couple of crew members with survival suits were helped up onto the slide by other crew members. Sixteen people from this raft were rescued this way, and one by helicopter.

Liferaft "J"

In one liferaft there was only one passenger, a Swede, and he was rescued by helicopter.

Liferaft "K"

In another raft two people were rescued, the repairman, and a male Swedish passenger. Both witnesses were washed from the hull by a wave. The Swedish passenger managed to climb onto a liferaft which was floating upside down. On board were two girls in their twenties. The Estonian repairman swam for about ten minutes before being hauled on board the raft by the others. All four of them lay close together to keep warm and also massaged and hugged each other. Waves sprayed over them constantly, and washed them into the water four or five times. Each time they helped each other back on board, someone always managing to hold on to some part of the raft. The men wanted to turn the raft the right way up but the girls were very nervous and afraid of going into the water voluntarily to make this possible. When a wave once again washed over the raft, the two girls slid away and disappeared. The last thing the witnesses heard was one of them groaning. Waves threw the two men into the sea at least twice more. After the last time, the Swedish passenger got caught in a rope, but the repairman managed to get on board again. He tried to pull up the Swede but they were now both too weak. The repairman held the Swede in the water by the hands

until a helicopter arrived and rescued them at about 0700 hrs.

Liferaft "L"

A musician wearing a lifejacket slid into the water and managed to get hold of a liferaft floating upside down with a man on the bottom. He did not manage to enter this but got onto another raft floating by the right way up. Once on board this, he helped another man, an Estonian passenger, by taking his hands and pulling him up. There were numerous calls for help nearby but he was unable to locate them in the dark. After a while it was silent. They were thus two in this liferaft and the canopy was released. They helped each other and fired distress rockets which were eventually seen by the SILJA SYMPHONY. Soon afterwards, a helicopter rescued them and landed them on board the vessel.

Liferaft "M"

One passenger crawled into a raft on the ESTONIA's hull. Other people threw themselves on top of the canopy of this raft. The raft slid and got stuck on the fender. Another passenger standing on top of the raft saw about 20 people running along the hull towards him. Several threw themselves on top of the canopy. It seemed dangerous to launch the raft from this height and they were arguing about whether the ship would stay afloat or sink. When the angle was favourable they dragged the raft towards the bridge where several rafts were floating in the water. As the raft slid, this witness was sitting and facing the direction of travel. When the raft hit the water, the witness was struck in the face by a floating object and fell overboard bleeding severely. He saw two rafts with the canopies released blowing towards him and managed to catch one of them. This raft was violently thrown by the waves several times against the hull of the ESTONIA.

The passenger who was under the canopy had to get out because the raft was full of water. He lost his trousers and shoes while fighting his way out and was completely naked. He managed to get over to another raft with several people inside and some on top of the canopy. He had the feeling that people were being exchanged by the waves, i.e. that some were washed into the sea and others were coming on board. He heard calls for help and screaming outside and tried for a long time to pull a man into the raft, holding on to him asking for help from the others inside the raft. One man could not help because he was bleeding severely and could not bend his face forward, and another was powerless to help because of an injured back. After about ten minutes he let the man go because he was afraid of losing all his remaining strength in attempting to pull him up or even holding him. Because of the water in the raft and because the waves were constantly flattening the canopy, he stood up to hold the canopy in place.

A third witness managed to grasp a rope to this liferaft. He reported that there were numerous people in the water and around the raft, many in panic. People were climbing onto his back and he got several bruises and scratches. The raft was thrown against the hull several times by the heavy sea. He got squeezed between the raft and the hull several times but by bracing his feet against the hull he managed to get on to the raft. During the struggle he injured his back against the hull.

Another witness reported that the raft slid down "at full speed" and that he jumped off. He fell into the water, hitting his head and his back. He swam towards this raft but found nothing to hang on to. A woman on it took his hand and held it. Several people in the water clung to his back and around his face. He also got a hand in his mouth. He got help from the woman to get onto the raft and when interviewed he stated that he could not have made it without her help.

This raft collided with another and the witness with the face injury managed to get hold of it. Several people climbed on his back to the other raft and when he lost his grip there were only five remaining, four male passengers and one woman, all Swedish.

The witness with the face injury has reported that one man was very active. He tried for over an hour to pull aboard a younger Estonian man but did not have the strength and the man eventually disappeared after calling for help in Estonian for quite a while. This witness also reported that there was a great deal of water in the raft and one male passenger stood, naked holding the canopy for most of the time. This witness could not move, let alone help because every movement increased the bleeding. (Later at the hospital, this man was found to have five facial fractures.)

The witness who held up the canopy has reported that an injured man in the raft was bleeding heavily from the face and holding the head of a woman above the water. The woman was wearing a brassiere and panties only. Occasionally waves flattened the canopy, causing this witness to fall. Every time, he forced it up again. While standing, he tried to close the openings to prevent any more water from coming in. He found the ropes to control the openings but did not find any place to fasten them and he therefore held them tight. He was standing for about four hours and became very tired.

The others tried to fire distress rockets but one of them ignited inside the raft filling it with smoke. No one was able to throw the rocket out and this witness had to stick his head outside for air. The woman, he reported, was becoming more and more listless and limp. She occasionally slid down into the water in the raft and was pulled up by the others, who tried to massage her and shake her to arouse her. One hour prior to their rescue, she died.

After several hours the sea movement changed. Water entered the raft and pushed down the canopy again. The occupants found nothing to bail with and have said that by now it was only a matter of minutes before they would have to give up. They were not able to struggle any more in a raft filled with water and with the canopy down.

They were saved by a Finnish helicopter at dawn, the rescue taking three or

four minutes. The witness who was standing up expected to be smoothly lifted by the helicopter as the last person. Instead, both he and his rescuer were violently jerked out of the raft by the wire, plunged deep into the water and then violently jerked up again to the helicopter

Liferaft "N"

One female Swedish passenger ran aft along the hull towards a raft. Several other people joined her when they were suddenly swept into the sea by a huge wave. Another female witness, a croupier, was also swept away, striking the bulkhead and then ending up deep under water. She reported being quite resigned to drowning, feeling the situation to be hopeless. She eventually surfaced close to a raft. Another female passenger jumped into a raft on the hull. This raft slid into the water and turned over. All those on board fell into the water and she swam for a while shouting for help. A male passenger jumped into a raft on the hull with two men and one woman in it. The raft slid into the water with a couple of people hanging on its outside.

The Swedish woman who had just surfaced swam to a raft and was helped on board by a man inside. Once on board she helped the croupier up, and the two women then pulled up four more persons. The women started to bail with their shoes. They urged others to help but most of the others seemed shocked or apathetic. The raft was taking in much water so one of the two women cut a rope hanging out from the raft (the rope to the sea anchor). After this the inflow decreased considerably. They shouted and urged each other to fight and to master the situation, and they were quite active. For about twenty minutes they struggled to drag on board a female Estonian shop assistant who had been swimming for a while, calling for help. In her report this shop assistant stated that she was helped by a Swedish female who tried for quite some time to pull her on board. After a while they also managed to get help from others and pulled her onboard. In addition to these three women this raft contained a male and a female Russian, an Estonian waitress, another Estonian shop assistant and an Estonian, a Swedish and a German passenger. The latter was pulled on board after about half an hour in the water.

One witness has reported that they had difficulties with the canopy and that there were no lights on board. Now and then this water-filled raft buckled and stretched out again and all the people were thrown together. Several were seasick and vomiting, only a few were active, signalling with torches and trying to bail out the water. One witness wound a rope around his arm to secure himself from being thrown out. The two most active women tried to fire distress rockets when they saw other ships but they were having difficulties in working out how to operate them. With some help, they managed to release one, which apparently was seen on board one of the ferries.

The raft floated near the ferry which lowered a raft with a rope. On board the ferry the crew called over a megaphone to the people in the ESTONIA raft to move over to theirs, where there were some men in orange coloured clothing helping them. This raft was then lifted by a hand-driven winch aboard the MARIELLA and nine people were rescued.

Liferaft "O"

One Swedish passenger jumped into the sea and came up close to a raft floating upside down. He got a grip and managed to hold on for a while. Suddenly a wave turned the raft right-side-up and the next wave washed this person into it. There was much water inside and he was alone. After about fifteen minutes he heard calls for help but was unable to see anyone in the darkness. Some time later a wave overturned the raft again and then immediately another one righted it. After this he realised that there was another man in the raft, an Estonian crew member. The lamp in the raft was alight and he found a survival blanket which he wrapped around himself. The two men were transferred to a raft lowered by a ferry and were hauled aboard at about 0500 hrs.

Liferaft "P"

One witness lost his lifejacket while running along the hull towards the water. In the water he bounced against the ship several times but suddenly a raft appeared "as from nowhere" quite close to him and he managed to grab hold. Another witness jumped from the funnel at the same time as the typhoon signal was heard and gained an empty raft. All around him there were calls for help and after some time he managed to pull inside a Lithuanian man. They helped others into the raft and after some time they were about 15 people. These included several crew members, a motorman, a store keeper, one able-bodied seaman and his wife, the welder, one cabin attendant, the hotel purser and one Estonian and four Swedish passengers.

One of the witnesses has reported seeing at least 20 rafts in the vicinity and hearing numerous calls for help, but without being able to locate the people. One of the passengers found a thermal protective suit and tried to put it on. The suit was too thin and tore in several places. There were no lights in the raft and because it was somewhat crowded, two people moved over to another raft. Those that remained drifted towards the MARIELLA, which launched a raft. The people climbed over to this raft and the MARIELLA crew hauled them on board.

Liferaft "Q"

One witness was washed overboard from the ESTONIA without a lifejacket. He sank deep under water several times but eventually managed to grip a rope from a raft. A man inside the raft bent over, took a firm grip on his collar and tried to pull him aboard. He lacked the strength, however, and the witness begged him to let go because he was near being strangled by the grip and could not breathe. The raft was too high and he could not find anything to climb on. He managed to get onto another, damaged, raft and from this he crawled into the first raft. In this raft there were about 15 people, many of them Estonian crew members, and they were very active. Many were signalling,

waving and shouting to ships nearby. All in this raft were rescued by a Finnish helicopter which put them on board the MARIELLA. A few witnesses from this raft have reported that they were totally exhausted and that they had only faint memories of being rescued.

Liferaft "R"

Witnesses from another raft have reported that they tried to pull it into the water from the hull. Suddenly the raft slid away with several people on board. Some witnesses had to let go their grip and they fell deep into the water. Others managed to stay aboard and there was much water in the raft. Another witness saw a man start to swim towards the raft, tried to pull him into the raft but the man was heavy, and disappeared. Another male witness was swimming towards the same raft and ended up underneath it. He managed to get loose and called for help. He was heard by someone inside who managed to get a grip on his arm. Around him were many people swimming and calling for help and the man inside reassured him that he would not let go. After a while he was pulled into the raft, by then completely exhausted. In this raft there were about 15 people, many of them seasick and vomiting both inside and outside the raft. They were having difficulties closing the canopy and there was much water inside. One witness reported that he used his boots to bail with. About 15 persons, 11 male and 4 female, were rescued from this raft, according to witness reports, and they were transported by helicopter to the SILJA EUROPA.

Liferaft "S"

A crew member, the system engineer, was releasing liferafts on the hull. He made them fast with ropes and when the angle was right he cut the ropes so the rafts could slide into the water. He slid together with a raft into the sea and, once inside, started to pull people on board from another crowded raft nearby. One passenger helped pull rafts into the sea. He fell into the water and when the raft turned over he managed to get hold of a lifejacket and climb in. Once aboard he helped several other people onto the raft.

A Swedish woman and a man holding hands jumped overboard and sank deep under the water. They lost their hold, and the man got a rope around his foot, which dragged him further down. He started to inhale water because he thought he was going to die. Eventually he freed himself by kicking off his shoe and he reached the surface. The woman got her lifejacket around her legs but surfaced quite near an upside-down raft. Together they managed to climb on board. Another witness climbed into this raft and started to help others by pulling them inside.

One Estonian passenger in the water saw a raft after a while, but was unable to reach it. After another 20 minutes in the sea he was dragged on board this raft by other people. It was full of water and people were lying together with their arms around one another to keep warm. The water made them slide around in the raft and it was difficult to stay on board without holding on to a rope or something else. One witness remembered that several people disappeared during the night. Several others were washed overboard several times but managed to get a grip on something and pull themselves aboard again. At times there was panic in the raft and several people died. One witness said that there were six or seven dead in the raft by morning. One witness, the AB seaman of the watch, found another raft and moved over to this, where he was alone. Altogether 16 people were rescued at about 0830 hrs by Finnish helicopters. During the lift to the helicopter one person fell into the sea and was later found dead.

Liferaft "T"

One Swedish passenger was thrown into the water and washed into an empty lifeboat. He saw a hand on the gunwale and tried unsuccessfully to pull the other person up. While he was struggling a wave turned the lifeboat upside down and he landed underneath. He kept hold of a keel rail on the outside of the boat but lost his grip when another wave came and he ended up near a raft, where he managed to get hold of a rope. He could not see where he was but later found he was under a liferaft which was floating upside down. The canopy was released and he managed to sit and stand inside this. On top of the upside-down raft there were three other men and he managed to contact them by pounding on the bottom of the raft above him. One of the men on top of the raft, the trainee 2nd officer, had been clinging on for a while unable to get onto it because his feet were caught in ropes. His lifejacket had slid down and was hanging around his waist. A boy helped him up. Lying on top of this upside-down raft there was also a naked elderly man.

The passenger under the raft shouted to the others on top not to forget him. After several hours he heard a helicopter and he pounded on the bottom again with the help of a distress rocket, afraid he would be forgotten. When the helicopter rescue man had hoisted the men off the top of the raft, he and the Swede below it were able to localise each other by pounding on the raft. The rescue man made a slit in the bottom with his knife and the passenger dragged himself out through this. He was rescued together with the others by a Swedish helicopter at about 0630 or 0700 hrs.

Liferaft "U"

One passenger fell from the bilge keel and reached the surface near several rafts. He was helped onto one and started helping others by pulling them in. After some time there were 11 people in the raft, most of them passengers. One woman was helped inside by a very strong Norwegian who later abandoned this raft for another one because he said it was leaking. A female witness who had been hanging outside was helped by a passenger and a big wave and managed to slide into the raft. Once aboard, she was completely exhausted and lay down seasick, dozing occasionally. Inside there were lights, and the canopy was raised.

One female Swedish passenger has reported that in this raft one person took the lead. Several were without lifejackets, some quite passive, one rather drunk and wearing only underpants. He got upset and started to fight with, the "leader", who tried to calm him down and to protect himself. The man fought violently and was not easily calmed. After about an hour, this man died in the arms of another passenger.

Somewhat later another man started to fight with the "leader", and there was some tumult but this man calmed down after a while. He was hanging on to a rope in the middle of the raft. He had suddenly became violent, shouting in English about knives, evidently wanting to cut his way out through the canopy.

Two men died during the night, one with a heart disease and the drunk man already mentioned. One witness reported that the "leader" was very active and did a fantastic and heroic job. After about two hours, witnesses heard someone outside the raft and managed to pull aboard a German passenger who had been swimming all the time. This person smelled strongly of diesel oil.

The witnesses in this raft tried to fire several distress rockets, one of which ignited inside the raft and filled it with smoke. People helped each other but some, wearing underwear only, became quite apathetic. Some people held others' heads above the water. From this raft twelve people were rescued at about 0700 hrs by a helicopter which put them on board the SILJA SYMPHONY.

Liferaft "V"

One woman jumped together with her husband into the water. The husband lost his lifejacket and her own slid down to her waist. She heard her husband tell her about the lifejacket and then he disappeared. Several other people inside this raft had slid from the hull down into the water. Some pulled themselves over from other rafts and others were pulled from the water by yet others. They were not able to close the openings and water sprayed in. There was about 20 cm of water on the bottom and almost all of the people were seasick and vomiting. Despite the terrible smell they were forced to lie very close with their arms around each other to keep warm.

During the night a hole developed in the bottom of the raft. The occupants mended it with reflector tape from their lifejackets. They used all the reflector tape on board and they also bailed with their shoes. All became increasingly fatigued and the bailing was, after some time, very slow. All were rescued by a Finnish helicopter at about 0900 hrs.

Reports from lifeboats

Lifeboat "A"

One crew member, a waiter, was thrown overboard from the starboard side. He swam towards a lifeboat and managed to get hold of it but lacked the strength to get into it. He clung to a rope for several hours and eventually worked up the strength to get on board. He heard many calls for help around him and at one time he remembered a young woman grasping the lifeboat but the next moment she was gone. In the boat he found two distress rockets which he fired. After four hours alone in this lifeboat he was rescued by a helicopter.

Lifeboat "B"

An Estonian head waiter got hold of the keel rail of an upside-down lifeboat. He rested for a moment and managed to climb up onto the bottom. On top of it there were already three men, one of them the third engineer. One man with severe head injuries later died.

Somewhat later the head waiter managed to help another man and a woman up onto the lifeboat. One of them had been floating on a wooden cupboard for about 30 minutes. In the darkness he heard and noticed someone in the water holding on to the lifeboat, but was unable to help and this person disappeared. The occupants of this lifeboat were all rescued by a helicopter at about 0400 hrs.

Lifeboat "C"

One Swedish passenger jumped into the water and was thrown around violently. While under water he gave up and inhaled water but eventually reached the surface. He saw a piece of wreckage and managed to get hold of it. A woman was holding on to the same wreckage and together they moved towards an upside-down lifeboat. The man's lifejacket was round his waist. The woman climbed up onto the keel of the lifeboat and helped others up. This witness was helped on to the keel, and held firmly on to the propeller, praying and calling to God. He reported that he had no contact with others around him, although he was aware of people in the water and behind him. He did not dare to loosen his grip. After a few hours, the woman who had helped him up disappeared.

Another witness jumped into the water and was very deep under. Surfacing, he swam for about 25 metres and became exhausted. Dead people were floating face down in the water around him. One lifeboat came near him upside-down. On this was a man holding on to the propeller, constantly praying and shouting to God in panic. The witness reported being annoyed by this screaming while he himself was helping others up on the boat. He managed to help a man up on the lifeboat and saw two others get onto it by themselves. A Swedish woman was hanging on to the lifeboat. He spoke to her and tried unsuccessfully to help her up. She was very frightened. He has reported her clinging onto the lifeboat for what seemed like an eternity, until a couple of big waves washed over the lifeboat and the woman disappeared.

This lifeboat drifted towards a ferry which illuminated it with a searchlight. Sometime thereafter a Swedish helicopter rescued the witnesses.

Report from one witness swimming

The second engineer was swept from the hull by a huge wave. In the water he managed to find two lifejackets and put

them on. He also had a torch with which he could signal. After swimming for more than three hours he was rescued by the ISABELLA at 0445 hrs.

6.3.13
Summary of witness reports concerning lifejackets

Many passengers reported difficulties with the lifejackets, all of which had "VIKING SALLY" printed on them. Several stated that the lifejackets appeared old-fashioned. One passenger said that they were tied together in threes and were difficult to separate. Others found the straps too short to be fastened at the crutch. Most witnesses did not understand how to put the lifejackets on, they did not seem to fit. Some reported that straps were missing or too short. Many witnesses put on two jackets and one witness who could not tie the vest at the crutch because the straps were too short tied the strap around his belt.

Many witnesses lost their lifejackets when they jumped or were washed into the water and several reported that the jackets slid down around their waists.

CHAPTER 7

THE RESCUE OPERATION

7.1 Summary of the operation

The ESTONIA sank in international waters in Finland's Search and Rescue Region (SRR), in its Archipelago Sea maritime SRR under the responsibility of the Maritime Rescue Co-ordination Centre (MRCC) in Turku. Consequently, Finland was responsible for the overall co-ordination of the Search and Rescue (SAR) operation.

On the night of the accident there were four large passenger ferries on the Finland–Sweden route, the MARIELLA and the SILJA EUROPA sailing westwards and the ISABELLA and the SILJA SYMPHONY eastwards. Another passenger ferry, the FINNJET, was sailing from Finland to Germany.

The first distress call was received from the ESTONIA at about 0122 hrs and was answered by the MARIELLA, which was north-east of and closest to the ESTONIA. When the distress call was heard on the SILJA SYMPHONY, a tape recorder was turned on to record the radio traffic.

A second distress call from the ESTONIA was received at 0124 hrs by 14 radio stations. One of these was MRCC Turku, which assumed control of the SAR operation.

At 0129 hrs the ESTONIA's position became known, and after receiving the distress message vessels in the vicinity turned towards the scene of the accident. The MARIELLA was by that time about nine nautical miles away from the ESTONIA. The SILJA EUROPA, which had direct radio contact with the ESTONIA during the distress traffic, assumed control of the distress radio traffic and at 0205 hrs MRCC Turku designated her master as the On-Scene Commander (OSC).

After receiving the distress call MRCC Turku alerted rescue units and those responsible for the management of the rescue services. The first units to be alerted were the coast guard patrol vessel TURSAS at 0126 hrs and stand-by maritime rescue helicopter OH-HVG in Turku at 0135 hrs. The helicopter took off at 0230 hrs. MRCC Turku formally designated the situation as a major accident at 0230 hrs and the appropriate alarms were initiated.

At 0142 hrs the MARIELLA informed Helsinki Radio about the accident. Instead of transmitting a Mayday Relay Helsinki Radio transmitted a Pan-Pan message at 0150 hrs.

Maritime Rescue Subcentre (MRSC) Mariehamn informed MRCC Stockholm of the accident at 0152 hrs, whereupon

Abbreviations

CSS	=	Co-ordinator Surface Search
DO	=	Duty Officer
DSC	=	Digital Selective Call
EDO	=	Emergency Duty Officer
GMDSS	=	Global Maritime Distress and Safety System
HF	=	High Frequency
MF	=	Medium Frequency
MRCC	=	Maritime Rescue Co-ordination Centre
MRSC	=	Maritime Rescue Co-ordination Subcentre
OSC	=	On-Scene Commander
SAR	=	Search and Rescue
SDO	=	Stand-by Duty Officer
SRR	=	Search and Rescue Region
VHF	=	Very High Frequency

Note: Times given in this chapter are quoted from the various log-books, reports and testimonies. For this reason times stated for the same event may differ by several minutes, depending on source.

the alerting of Swedish maritime rescue helicopters was initiated. The first of these, stand-by helicopter Q 97, took off at 0250 hrs.

MRCC Helsinki notified MRCC Tallinn of the accident at 0255 hrs.

The MARIELLA was the first vessel to reach the scene of the accident, at 0212 hrs. At this time many persons, liferafts, lifeboats and lifejackets could be seen in the water. People were heard screaming in the sea. At 0230 hrs the SILJA EUROPA arrived and by 0320 hrs all five passenger ferries had reached the scene of the accident.

OH-HVG arrived as the first helicopter at the scene of the accident at 0305 hrs, and Q 97 arrived at 0350 hrs.

About 0450 hrs there were four helicopters and eight vessels on the scene, and the number of rescue units continued to increase. The TURSAS arrived at 0500 hrs. By 1200 hrs 19 vessels and 19 helicopters had arrived to participate. In addition three aircraft assisted in the search and in the control of the radio traffic.

The helicopters used rescue men and winches to pick people up from the sea and liferafts. Two helicopters transferred survivors to the nearest passenger ferries, while the others flew them to land-based assembly points.

The vessels did not launch their own man-over-board (MOB) boats or lifeboats due to heavy weather. Instead, liferafts were lowered to the sea and were then raised with survivors transferred from the ESTONIA's liferafts. The ISABELLA lowered its rescue slide, and 16 survivors were rescued by being pulled up it.

The last survivor was rescued at about 0900 hrs. After this, the helicopters and vessels searched for and brought up bodies from the sea and from rafts.

The helicopters operated in the area from the early morning for about 15 hours. Most of the vessels searched the whole day and were released from their duties in the evening. The last vessel to be released was the SILJA EUROPA which left the area about 2030 hrs, relieved by the TURSAS, whose master was appointed Co-ordinator Surface Search (CSS) until 3 October.

The vessels rescued 34 survivors and the helicopters rescued 104 survivors. One rescued person later died in hospital. Ninety-four bodies were recovered from the sea. Missing persons totalled 757.

7.2 The rescue organisation

7.2.1 General

The basis of the international rules covering the search for and rescue of human beings at sea is the 1979 International Convention on Maritime Search and Rescue (the SAR Convention). This entered into force in 1985 and Sweden and Finland have ratified it. Some of the Convention's provisions deal with the organisation of maritime rescue services and international co-operation in this respect. These include the decision to establish Search and Rescue Regions (SRR) in agreement with neighbouring countries, each with at least one Maritime Rescue Co-ordination Centre (MRCC), and if necessary subordinate centres known as Maritime Rescue Subcentres (MRSC).

The Convention also contains provisions governing the duties and operational procedures of these rescue centres. According to the provisions an MRCC is "a unit responsible for promoting efficient organisation of search and rescue (SAR) services and for co-ordinating the conduct of SAR operations within an SRR". If the position of the ship is known the responsibility for initiating SAR operation will be that of the MRCC or MRSC in which area the ship is located.

As well as in the SAR Convention, the tasks of an MRCC are laid down in the IMO Search and Rescue Manual and in national provisions. Some of their main tasks are summarised below:

- An MRCC prepares detailed plans for conduct of SAR operations in its own area. Each MRCC and MRSC maintains up-to-date information relevant to SAR operations in its area.
- An MRCC should be in a constant state of operational readiness.
- When an MRCC receives a distress signal, it must establish the facts of the situation, so as to determine the state of emergency and decide on the extent of the operation required.
- The MRCC initiates and co-ordinates the operation through the available rescue units in accordance with a plan of action.
- The MRCC notifies the owner of the vessel and the appropriate authorities of the operations being launched. Other MRCCs and MRSCs and rescue units which may be concerned must also be notified and kept informed of developments.
- When the emergency no longer exists, or further search seems useless, the MRCC terminates the operation and notifies the authorities and individuals who had previously been informed.
- The sphere of authority of the MRCC in each country is established by national provisions.

The IMO Search and Rescue Manual (IMOSAR) is a supplement to the SAR Convention. It provides guidelines for a common maritime SAR policy, encouraging all coastal states to develop their organisations on similar lines and enabling adjacent states to co-operate and provide mutual assistance.

The IMO Merchant Ship Search and Rescue Manual (MERSAR) is a second manual based on the SAR Convention. This contains guidelines for masters of ships that may be called upon to act in connection with SAR operations.

The International Convention for the Safety of Life at Sea (SOLAS) is the most important convention dealing with maritime safety. It contains provisions concerning the responsibility of the master of a ship when he becomes aware of an emergency at sea involving a risk to human life. It also enjoins each Contracting Government to ensure that any necessary arrangements are made for coast

watching and for the rescue of persons in distress at sea around its coast.

The Radio Regulations (RR) appurtenant to the International Telecommunication Convention contain provisions governing communications in a distress situation.

7.2.2 Finland

General

At the time of the accident the rescue services in Finland consisted of three parts, the General Rescue Service, the Aeronautical SAR Service, and the Maritime SAR Service.

The Ministry of the Interior was responsible for the general management and co-ordination of the rescue services.

The General Rescue Service covered operations related to fires and general rescue operations carried out by the local rescue services, such as the fire brigades, the police, the medical centres and ambulance units as well as the auxiliary volunteer organisations, e.g. the National Commission for Volunteer SAR Services. The Finnish Lifeboat Society co-ordinated voluntary SAR services at sea.

The Aeronautical SAR Service covered rescue operations concerning aircraft or carried out with aircraft. It also supported the General Rescue Service and the Maritime SAR Service. The responsible authority for the Aeronautical SAR services was the Civil Aviation Administration, under the Ministry of Transportation and Communications.

The Aeronautical Rescue Co-ordination Centre (ARCC) for Southern Finland was in Tampere.

Maritime SAR service

The maritime SAR operations in Finland were governed by the Maritime Search and Rescue Act and Decree. The Act and Decree defined the authorities which had to participate in maritime SAR services and their following functions:

- The Frontier Guard carried out maritime SAR operations and attended to the planning, management and supervision of maritime SAR services as well as to the co-ordination of the operation.
- The Defence Forces watched over marine areas in order to detect and locate emergencies. It also participated in SAR operations.
- The National Maritime Administration attended to distress and safety communications and to the co-ordination of these, and participated in SAR services operations.
- The police, the National Board of Customs, the Road Administration and the local rescue authorities participated in SAR operations.
- The health care authorities attended to the medical aspects of rescue operations.
- The aviation authorities participated in maritime rescue operations through the aeronautical SAR organisation.
- Helsinki Radio was a national coast radio station, owned by Telecom Finland, from which the National Maritime Administration purchased distress and safety radio communication services.

MRCC and MRSC

Finland's SRR encompassed Finnish territorial waters as well as international waters as agreed with neighbouring countries. The region was divided into three maritime rescue regions, each with its own MRCC, situated in Helsinki, Turku and Vaasa. The accident took place in the Archipelago Sea Maritime SRR, under MRCC Turku.

Each MRCC was operated by the Frontier Guard. MRCC Helsinki was manned by staff of the headquarters of its Gulf of Finland Coast Guard Section, MRCC Turku by those of the headquarters of its Archipelago Sea Coast Guard Section and MRCC Vaasa by those of the headquarters of its Gulf of Bothnia Coast Guard Section. Each MRCC was headed by a commander of the coast guard section or an officer designated by him and assisted when necessary by a maritime rescue expert group. This group consisted of the authorities mentioned in the Maritime SAR Decree, representatives of volunteer SAR services, and other experts as needed.

Under MRCC Turku there were MRSC Mariehamn and MRSC Turku. MRSC operations were directed by the commander of the respective coast guard sub-district, assisted when necessary by an expert group. MRSC Turku located at Pärnäinen in the island of Nauvo, was a combined maritime traffic and coast guard centre also known as Turku Radio.

The MRCCs were manned around the clock to a readiness to receive distress messages 24 hours a day and initiate rescue operations. During office hours, two to three persons worked in an MRCC, a duty officer (DO), a radio operator and the chief officer of the centre. Outside office hours the practice varied, with one or two persons, depending on the resources of the coast guard section. However, the radio operators worked in regular shifts. A stand-by duty officer (SDO) and a coast guard emergency duty officer (EDO) were on stand-by at home, ready to arrive for advanced operational management at one hour's notice.

Outside office hours an MRSC was manned by only one person. However, MRSC Turku, as a maritime traffic centre and rescue subcentre, was manned by two.

Planning for major accidents

In each SRR there was a plan outlining operations in the event of a major accident. For the Archipelago Sea Maritime SRR the major accident rescue plan was adopted on 18 June 1991. The main elements of the plan were risk assessments, the basis for SAR operations, the SAR plan, communications and public information. Separate annexes included diagrams and illustrations of the chain of command for SAR, alarm arrangements, assembly points and radio communications.

The applicability of the plan had been tested in several SAR exercises involving simulated accidents to passenger ferries.

The tasks of the rescue leaders of MRCC Turku according to the plan were (Supplement):

the duty officer

- to know the readiness situation of the rescue units,
- to keep a radio log of communications traffic and mark the information on the situation map,
- to order the most rapidly operational maritime rescue units to the scene of an accident, (to conduct rescue operations and obtain a detailed assessment of the situation,
- to alert the SDO and the EDO,
- to start general alerting according to the alarm diagram,
- to order the latest weather reports and forecasts, and to order drift calculations if needed.

the stand-by duty officer

- to alert further resources if needed,
- to alert the commander and other necessary personnel,
- to inform the headquarters of the frontier guard, the adjacent coast guard section, the Ministry of Environment and the shipping company affected,
- to draft a press release and publish it.

the emergency duty officer

- to lead the operation as an assistant or deputy to the commander,
- to organise the work of the maritime rescue expert group,
- to inform neighbouring states.

Further tasks were addressed to the MRCC generally, not assigned to individuals.

Other rescue resources

When operating at sea, coast guard vessels, patrol boats and helicopters were at the highest readiness to participate in SAR missions. Maritime SAR helicopters at base during office hours were on almost immediate take-off alert. At other times, on-duty helicopters were at the highest readiness (one hour).

7.2.3 Sweden

The basis for Sweden's maritime SAR services – in addition to the international conventions mentioned under 7.2.1 – was the 1986 Swedish Rescue Act which was drafted to correspond with these conventions. The maritime SAR service was one part of the national SAR services.

The National Maritime Administration was responsible for Sweden's maritime SAR service.

Maritime SAR operations in Sweden's SRR in the northern Baltic were conducted and co-ordinated by MRCC Stockholm located at Telia Mobitel AB's coast radio station in Stockholm. Under contract to the Maritime Administration, Telia Mobitel AB provided distress and safety watch-keeping as well as maritime SAR co-ordination services. In the event of a maritime SAR effort the coast radio station personnel could be used to support MRCC normal manning in accordance with an agreed personnel plan. The MRCC was always manned by a maritime SAR duty officer and a deputy duty officer. Another deputy was on thirty minutes stand-by.

The maritime rescue units used consisted of state-owned vessels, helicopters and aircraft, and vessels belonging to the Swedish Sea Rescue Institution. Both the Navy and the Air Force had helicopters suitable for maritime SAR missions (Boeing Kawasaki 107 and Super Puma, respectively).

The Aeronautical Co-ordination Centre (ARCC) was at Arlanda Airport outside Stockholm. ARCC Arlanda commanded all military helicopters in SAR operations and was responsible for alerting civilian air units.

To co-ordinate rescue operations, primarily on land, and to provide alarm services, a publicly-owned special company had been formed, SOS Alarm. This company had 20 SOS centres, together covering the whole of Swedish territory. Each regional centre had agreements with the regional medical services on the basis of which they could alert hospitals and prepare them when a major accident had happened.

7.2.4 Estonia

In Estonia the National Maritime Administration was responsible for the SAR operations at sea in accordance with the Estonian Merchant Shipping Code. To perform this function, the Maritime Administration established the Coast Guard Department, which besides maritime SAR matters also dealt with the localisation and combating of marine pollution.

Although Estonia had not ratified the SAR Convention before the accident, the coast guard service acted in accordance with the Convention as closely as possible.

The MRCC was situated in Tallinn and was manned round the clock. If the situation called for it, the co-ordinators called in other experts.

MRCC Tallinn carried out maritime SAR operations in co-operation with the National Border Guard Administration, the Estonian State Sea Inspection Agency, the Estonian Lifesaving Association, the Estonian National Rescue Board and ARCC Tallinn.

7.2.5 Co-operation

Finland and Sweden

An agreement between Finland and Sweden on maritime and aeronautical SAR and a protocol thereto entered into force on 20 March 1994. This agreement replaced one of 1982.

The agreement states that the border between the maritime and aeronautical rescue services of the respective countries is also the border of the flight information regions (FIR). It also covers notification, mutual assistance, joint rescue exercises, regular tests of the communications between the states, mutual visits of rescue service experts and exchange of information and experience on rescue services.

Co-operation since 1982 has included maritime SAR exercises in 1990 and

1992 concerning simulated accidents to passenger ferries.

Practical SAR co-operation has primarily been between MRCC Turku and MRCC Stockholm. MRSC Mariehamn has been in frequent contact with MRCC Stockholm, primarily in connection with maritime SAR in the Åland Sea and the southern part of the Gulf of Bothnia.

Finland and Estonia

Finland and Estonia entered into an interim agreement on maritime SAR on 15 June 1992, under which the border between the rescue areas is the same as the border between the respective flight information regions (FIR). The arrangements regarding operational and notification obligations in the event of a maritime emergency are the same as in the agreement between Finland and Sweden.

In addition to this agreement, the Finnish Frontier Guard and the Estonian Border Guard concluded on 24 May 1994 a protocol on co-operation in saving human lives at sea and on the related air operations.

Estonia appointed the National Maritime Administration as responsible maritime SAR authority and the Coast Guard operations centre as MRCC Tallinn with effect from 1 January 1993.

The bodies responsible for practical operations are the headquarters of the Gulf of Finland Coast Guard Section and the headquarters of the Estonian Border Guard.

The arrangements for meetings between representatives of the respective parties are the same as in the agreement between Finland and Sweden.

After the interim agreement entered into force, a joint maritime rescue exercise concerning a simulated accident to a passenger ferry off Helsinki was organised jointly by Finland, Estonia and the Russian Federation on 21 October 1992.

Between 1992 and 1994 Finnish and Estonian maritime rescue authorities and volunteers have met considerably more often than required by the agreement, to develop co-operation in maritime SAR matters.

Sweden and Estonia

At the time of the accident there were no maritime SAR co-operation agreements between Sweden and Estonia.

However, since 1991 Sweden has trained personnel from Estonia in SAR management and co-ordination. Courses and seminars have been conducted in Sweden and Estonia.

7.3

The maritime radio distress and safety systems and the distress traffic

7.3.1 The maritime radio systems

The SOLAS convention requires that all passenger vessels on international voyages and all cargo vessels of at least 300 tons gross are equipped with a maritime radio station for distress and safety. There are two maritime radio systems in use, an old one here termed the pre-Global Maritime Distress and Safety System (pre-GMDSS), and a new one, the GMDSS. All vessels and coast radio stations must change to the GMDSS during a transition period ending on 1 February 1999. During this period, vessels may be equipped with either system.

In the old system the radio station on board a vessel may be either a radiotelegraph station or a radiotelephone station. The international distress and safety frequencies are: 500 kHz for radiotelegraphy and 2182 kHz and VHF channel 16 for radiotelephony. In a radiotelegraph station all these frequencies are required and a vessel must carry a radio officer holding a radiotelegraph operator's certificate. For radiotelephone stations the telephone frequencies are required and the station is operated by deck officers holding a radiotelephone operator's general certificate (GOC).

In the GMDSS every ship while at sea shall be capable of transmitting ship-to-shore distress alerts by at least two separate and independent means. Therefore the equipment of the radio station on board a vessel is governed by the sea area of sailing. Four sea areas exist: A1 (VHF communication), A2 (MF communication), A3 (satellite communication) and A4 (HF communication). All ships must also be capable of receiving shore-to-ship distress alerts, and of transmitting and receiving ship-to-ship distress alerts and SAR co-ordinating communications. Except when satellite communications are used, the communication is initiated with a digital selective call (DSC), which is received fully automatically by other stations. The international distress and safety frequencies for DSC are: VHF channel 70, MF 2187.5 kHz, and five frequencies in the HF band. After contact by DSC the stations shift to the distress and safety frequencies for radiotelephony: on VHF to channel 16 and on MF to 2182 kHz. The radio station on board a vessel is operated by deck officers holding a general operator's certificate or a restricted operator's certificate (ROC).

A reserve source of electrical power must be provided on every ship to supply the radio installation, for conducting distress and safety radio communication in the event of failure of the ship's main and emergency power sources.

In both systems, the radio equipment on board a vessel also includes an emergency position indicating radio beacon (EPIRB). The EPIRB is a small radio buoy of "float-free" structure. If the vessel sinks, the buoy is released, rises to the surface and begins to transmit a distress alert. Three (or two) portable VHF radiotelephones are also required. They can accompany the lifeboats or liferafts when the vessel is abandoned.

With the pre-GMDSS a vessel in distress alerts primarily other vessels in the vicinity. With the GMDSS the intention is for the distress alert always to be routed to shore, primarily to rescue co-ordination centres. At the same time, other vessels in the vicinity will be alerted. Both systems can be used to transmit, on behalf of others, a distress message –

Mayday Relay (pre-GMDSS) or Distress Alert Relay (GMDSS) – e.g. when the vessel in distress cannot itself transmit a message or when further assistance is required.

Distress traffic must always be initiated by using the procedures specified by the Radio Regulations. With the old system for radiotelegraphy on 500 kHz, a radiotelegraph alarm signal must be transmitted, and for radiotelephony on 2182 kHz, a radiotelephone alarm signal must be transmitted. The purpose of the alarm signals is to arise attention and to turn on the muted loudspeakers of the radiotelegraph and radiotelephone auto alarm receivers keeping automatic watch on 500 kHz and 2182 kHz, respectively. After the alarm signal, a distress call is transmitted, followed by the distress message. On VHF channel 16, only a distress call and a distress message are transmitted.

In the GMDSS the distress traffic is initiated on 2187.5 kHz and VHF channel 70 by transmitting a distress alert using DSC. After DSC acknowledgement, primarily by a coast station, the distress traffic is shifted to the radiotelephone distress and safety frequency on the band where the acknowledgement was received.

The ESTONIA was equipped in compliance with the old system with a radiotelegraph station and a radiotelephone system. The radio installation and the competence of those serving it satisfied the SOLAS requirements. For details of the equipment, see 3.2.9. Regarding the formal competence of the crew, see 4.2.2. In addition various crew members had some 30–35 portable VHF maritime radiotelephones (including channel 16) not indicated in the vessel's radio licence.

The radio officer of the ESTONIA had special watchkeeping hours, 1900–0100 hrs, during which he kept watch on the radiotelegraph distress and safety frequency 500 kHz. At other times, the frequency was monitored by a radiotelegraph auto alarm. The radiotelephone frequencies 2182 kHz and VHF channel 16 were monitored on the bridge.

Table 7.1 Stations keeping watch on the night of the accident.

Coast station	500 kHz	2182 kHz	VHF 16	DSC 2187.5 kHz	DSC VHF 70
Helsinki Radio, Finland (controlled also Mariehamn Radio)	X	X	X	X	
MRCC Turku, Finland		X	X	X	
MRSC Turku, Finland		X	X	X	
MRCC Helsinki, Finland		X	X	X	
MRCC Vaasa, Finland		X	X	X	
Tallinn Radio, Estonia	X	X	X		
Stockholm Radio, Sweden	X	X	X	X	
Tingstäde Radio, Sweden	X	X	X		
Karlskrona Radio, Sweden	X	X	X		
Riga Radio, Latvia	X	X	X		
Ventspils Radio, Latvia	X	X	X		
Klaipeda Radio, Lithuania	X	X	X		
Kaliningrad Radio, Russia	X	X	X		
Gdynia Radio, Poland	X	X	X		
Witowo Radio, Poland	X	X	X	X	
Szczecin Radio, Poland	X	X	X		
Rügen Radio, Germany	X	X	X	X	
Lyngby Radio, Denmark	X	X	X		X
Leningrad Radio, Russia (St. Petersburg Radio)	X	X	X		
Vyborg Radio, Russia	X		X		

Table 7.2 Receiving radio stations and recorded times.

Radio station	First Mayday call	Second Mayday call	Reference
SILJA EUROPA	0120 hrs	yes	log book
ANETTE	0120 hrs	yes, no time	log book, officer
ANTARES	0120 hrs	yes no time	extract from log book
SILJA SYMPHONY	0122 hrs	0123 hrs	log book, lookout
MRSC Turku	0123 hrs	0124 hrs	operator, recording
Turku Radio	0123 hrs	0125 hrs	operator, radio log
MRCC Turku	—	0124 hrs	operator, radio log
Utö coastal fortress	—	0124 hrs	radio operator, radio log
Kökar coast guard station	—	0124 hrs	radio log
FINNJET	—	0124 hrs	log book
MRSC Mariehamn	—	0125 hrs	radio log
FINNMERCHANT	—	0130 hrs	second officer
MARIELLA	yes, no time	yes, no time	log book, protocol
GARDEN	—	yes, no time	master

7.3.2 Distress and safety watch

Vessels

Every vessel at sea must keep continuous radio watch for distress and safety. Vessels with radiotelegraph stations keep watch 500 kHz, 2182 kHz and VHF channel 16. The frequency 500 kHz is watched by a radio officer or by the radiotelegraph auto alarm, while 2182 kHz is watched with a loudspeaker, filtered loudspeaker or muted loudspeaker on the bridge. This latter method where the equipment functions as a radiotelephone auto alarm is the most common. VHF channel 16 is watched on the bridge. Vessels with radiotelephone stations keep continuous watch on 2182 kHz and VHF channel 16 as above. Vessels with GMDSS radio stations keep automatic watch by DSC on the bridge on VHF channel 70 and, if the radio installation is for other sea areas than A1, also on 2187.5 kHz. During the transition period – ending in February 1999 – GMDSS vessels must also keep watch on 2182 kHz and VHF channel 16.

Coast stations

Several rescue co-ordination centres and other coast stations keep continuous watch on 2182 kHz and VHF channel 16. Some rescue co-ordination centres and many other coast stations keep watch on 500 kHz. At the beginning of 1993, the Finnish Maritime Administration established sea area A2 covering the Gulf of Finland, the Northern Baltic and the Gulf of Bothnia. Continuous distress and safety watch is kept on 2187.5 kHz by DSC, by the Finnish rescue co-ordination centres and by Helsinki Radio.

At night the radio traffic in the Baltic area on distress frequencies 500 kHz, 2182 kHz and 2187.5 kHz can usually be received throughout the entire Baltic, unless the frequencies are badly disturbed. The ranges over which messages may be transmitted on the VHF channels depend greatly on the structure and height of the antenna and are normally under 100 km.

According to the List of Coast Sta-

Table 7.3 The distress traffic.

Recording by MRSC Turku:

Relative time, min.	Absolute time, hr:min.sec	From	To	Transmission
–2.05	**01:21.55**	**Estonia**		**Mayday Mayday Estonia please (unclear)**
–1.46	01:22.14	Mariella	Estonia	Estonia, Mariella
–1.26	01:22.34	Mariella	Estonia	Estonia, Mariella over
Recording by the SILJA SYMPHONY:				
–0.49	**01:23.11**	**Estonia**		**Europa, Estonia, Silja Europa, Estonia**
–0.41	01:23.19	Silja Europa	Estonia	Estonia this is Silja Europa replying on channel 16.
–0.34	**01:23.26**	**Estonia**		**Silja Europa**
–0.27	01:23.33	Silja Europa	Estonia	Estonia this is Silja Europa on channel 16.
–0.06	**01:23.54**	**Estonia**		**Silja Europa, Viking, Estonia**
–0.02	01:23.58	Mariella	Estonia	Estonia, Estonia
0.00	**01:24.00**	**Estonia**		**Mayday Mayday**
0.05	**01:24.05**	**Estonia**		**Silja Europa, Estonia**
0.07	01:24.07	Silja Europa	Estonia	Estonia, Silja Europa. Are you calling Mayday?
0.28	01:24.28	Silja Europa	Estonia	Estonia, what's going on? Can you reply?
0.31	**01:24.31**	**Estonia**		**This is Estonia. Who is it there? Silja Europa, Estonia**
0.40	01:24.40	Silja Europa	Estonia	Yes, Estonia this is Silja Europa
0.42	**01:24.42**	**Estonia**	**Silja Europa**	**Good morning. Do you speak Finnish?**
0.45	01:24.45	Silja Europa	Estonia	Yes, I speak Finnish.
0.46	**01:24.46**	**Estonia**	**Silja Europa**	**Yes, we have a problem here now, a bad list to the right side. I believe that it was twenty, thirty degrees. Could you come to our assistance and also ask Viking Line to come to our assistance?**
0.58	01:24.58	Silja Europa	Estonia	Yes, Viking Line is just behind us and they surely got the information. Can you give your position?
1.04	**01:25.04**	**Estonia**	**Silja Europa**	**...(unclear)...we have black out, we cannot get it now. I cannot say it.**
1.12	01:25.12	Silja Europa	Estonia	Okay, understood, we'll take measures.
1.24	01:25.24	Mariella		Silja Europa, Mariella
1.26	01:25.26	Silja Europa	Mariella	Yes Europa here, Mariella ... Mariella this is Europa 16.
1.33	01:25.33	Mariella	Silja Europa	Did you determine their position, is it they who are here on our port side?
1.39	01:25.39	Silja Europa	Mariella	No, I didn't get any position from them, but they must be here in the neighbourhood, they have 20–30 degrees starboard list and black out.

Relative time, min.	Absolute time, hr:min.sec	From	To	Transmission
1.50	01:25.50	Mariella	Silja Europa	I think that they are on our port side here approximately 45 degrees.
1.56	01:25.56	Silja Europa	Mariella	Okay, yes, I am just waking up the skipper.
2.41	**01:26.41**	**Estonia**		**Silja Europa, Estonia**
2.44	01:26.44	Silja Europa	Estonia	Estonia, Silja Europa
2.45	**01:26.45**	**Estonia**	**Silja Europa**	**Are you coming to assistance?**
2.47	01:26.47	Silja Europa	Estonia	Yes, we are. Can you tell me if you have an exact position?
2.50	**01:26.50**	**Estonia**	**Silja Europa**	**I cannot say because we have black out here.**
2.54	01:26.54	Silja Europa	Estonia	Yes, can you see us, or?
2.57	**01:26.57**	**Estonia**	**Silja Europa**	**Yes, I can hear you.**
3.01	01:27.01	Silja Europa	Estonia	Okay, we will start to determine your position here now. Just a moment.
3.07	01:27.07	Silja Europa	Estonia	Yes, of course we will come to your assistance, but now we have to determine your position.
3.15	01:27.15	Mariella		Helsinki Radio, Helsinki Radio ...calling on channel 16 ... Helsinki
4.17	01:28.17	Silja Europa		Mariella, Silja Europa
4.25	01:28.25	Mariella	Silja Europa	Yes, this is Mariella
4.27	01:28.27	Silja Europa	Mariella	Yes, have you any visual contact at all with Estonia?
4.31	01:28.31	Mariella	Silja Europa	No
4.35	01:28.35	Silja Europa	Mariella	We must start and try to find her somewhere, it is a bit difficult to say as they didn't give any position.
4.43	**01:28.43**	**Estonia**		**Silja Europa, Estonia**
4.45	01:28.45	Silja Europa	Estonia	Yes, Estonia, Silja Europa
4.47	**01:28.47**	**Estonia**	**Silja Europa**	**I'll tell you our position now.**
4.50	01:28.50	Silja Europa	Estonia	Yes, go ahead.
4.52	**01:28.52**	**Estonia**	**Silja Europa**	**58 latitude, just a moment ... 22 degrees.**
5.01	01:29.01	Silja Europa	Estonia	Okay, 22 degrees, understood, we're on our way there.
5.05	**01:29.05**	**Estonia**	**Silja Europa**	**So 59 latitude and 22 minutes.**
5.16	01:29.16	Silja Europa	Estonia	59.22 minutes and longitude?
5.19	**01:29.19**	**Estonia**	**Silja Europa**	**21.40 East.**
5.23	01:29.23	Silja Europa	Estonia	21.40 East, okay.
5.27	**01:29.27**	**Estonia**	**Silja Europa**	**Really bad, it looks really bad here now.**
5.36	01:29.36	Silja Europa	Estonia	Yes, looks bad. We are on our way and it was 21.40.
5.39	**01:29.39**	**Estonia**	**Silja Europa**	**... you said** (unclear)
5.42	01:29.42	Silja Europa	Estonia	48, okay.

tions at least the stations given in Table 7.1 were keeping watch on the distress and safety frequencies in the Baltic on the night of the accident.

On VHF channel 16, Helsinki Radio and MRCC Turku were using the same base stations in Utö, Järsö and Hanko, near the site of the accident. MRSC Turku was also using the Utö base station.

Channel 16 was also being watched by MRSC Mariehamn, MRSC Hanko, coast guard stations in Kökar, Storklubb and Hiittinen and central pilot stations in Nauvo and Hanko, near the site of the accident.

7.3.3 The recorded distress traffic

The facts regarding the distress traffic from the ESTONIA, which was transmitted on VHF channel 16, are based on recordings and log entries regarding the traffic. The distress traffic was initiated by the second officer A. Two minutes later the third officer took over as operator. The initiation of the distress traffic was recorded only by MRSC Turku. Except for the initiation, the distress traffic was recorded by the SILJA SYMPHONY among others. This recording has the best quality.

MRCC Turku had a system that should continuously record all radio traffic on VHF channel 16. However, the equipment did not function properly. Thus, the beginning of the recording primarily contains only its own traffic.

The distress traffic was conducted mainly in either Swedish or Finnish; English was used very little.

The distress traffic started with a call[1] which reads as follows: "Mayday Mayday Estonia please". Shortly afterwards a second call – "Mayday Mayday Silja Europa" – was transmitted.

The Mayday calls were received by 14 ship- and shore-based radio stations (Table 7.2).

It is evident from the table that there are considerable differences between the times for recording the two Mayday calls. At least five radio stations, including MRCC Turku, logged the *2nd Mayday call*

[1] The Commission names this call as *1st Mayday call* and the second one as *2nd Mayday call*.

as received at 0124 hrs. Counting backwards in tape recordings from this moment, the most probable time of the *1st Mayday call* was just before 0122 hrs. However, this time is uncertain, the margin of error being plus/minus two minutes. Despite the imprecision of this timing, the transcript in Table 7.3 is given second-by-second so that the time difference between different messages can be seen; the relative precision of the timing is good up to the time the tape was turned over.

The full text of the distress traffic is in English in Table 7.3. Messages transmitted by the ESTONIA are in bold. For the full transcript of the recordings, see Supplement. After the distress traffic in Table 7.3, the ESTONIA no longer transmits.

Table 7.4 shows times of the other stations' first transmissions on VHF channel 16 in response to the distress of the ESTONIA.

7.3.4 EPIRB beacons

No signals from the ESTONIA's EPIRBs were received, for further details see 8.11.

7.4 Initiation of rescue actions

7.4.1 General

On responding at 0123 hrs to the *1st Mayday call*, the SILJA EUROPA became the control station for the distress radio traffic. The other ships and shore-based stations in the area that had received the Mayday calls understood and accepted the resulting situation. When the full importance of the distress messages was understood on board the vessels they began to contact the SILJA EUROPA to verify information received, report their positions and inform her about measures being undertaken.

Table 7.4 Other stations' response times on channel 16.

Relative time, min.sec	Absolute time, hrs:min.sec	Station
06.49	01:30.49	ANETTE
12.25	01:36.25	FINNJET
16.07	01:40.07	FINNMERCHANT
17.21	01:41.21	Helsinki Radio
19.22	01:43.22	SILJA SYMPHONY
19.30	01:43.30	ISABELLA
20.44	01:44.44	MRCC Turku
32.10	01:56.10	ANTARES
36.37	02:00.37	MASTERA

Helsinki Radio did not receive the ESTONIA's distress message nor the subsequent radio communications. The MARIELLA informed Helsinki Radio by NMT telephone of the distress at 0142 hrs after failing to get contact on channel 16 and on 2182 kHz. On request by the SILJA EUROPA, MRCC Helsinki also alerted Helsinki Radio.

The channel 16 distress traffic transmitted by the ESTONIA did not reach the coast radio stations in Sweden or Estonia because of the distance.

Helsinki Radio transmitted at 0150 hrs a Pan-Pan (urgent message) of the accident instead of a Mayday Relay (distress message), which MRCC Turku had requested several times by telephone, VHF and via MRCC Helsinki. The Pan-Pan message was transmitted to all stations on 2182 kHz and channel 16. These transmissions were not received by the coast radio stations in Sweden or Estonia.

7.4.2 Action

In accordance with the organisation and division of responsibility of the Finnish SAR services, the overall responsibility for the SAR action in the case of the ESTONIA was held by the commander of the Archipelago Sea Coast Guard Section or by the coast guard officer designated by him. The headquarters of the Coast Guard Section in Turku served as the MRCC, where at night a duty officer was prepared to initiate and carry out all relevant coast guard management functions. He was supported by two stand-by duty officers at home on one-hour stand-by.

Two minutes after receiving the *2nd Mayday call* MRCC Turku began, at 0126 hrs, to alert the various groups involved according to the diagram in the Major Accident Rescue Plan (Figure 17.1). Important events in the alerting and the rescue operation are summarised in Table 7.5. Only Finnish and Swedish stand-by helicopters and the first five vessels to arrive are mentioned in the table. Events after 0500 hrs are commented on very briefly.

7.5 The rescue operation

7.5.1 The sea traffic in the area

The mouth of the Gulf of Finland is the busiest maritime area in the northern Baltic Sea. Here the traffic proceeds towards the southern Baltic or west towards Sweden. Cargo vessel traffic in the Archipelago Sea uses primarily the Utö route. In the western part of the northern Baltic, a traffic route goes between Bogskär lighthouse island and Svenska Björn caisson lighthouse to the Gulf of Bothnia. Vessels entering the Gulf of Finland from the southern Baltic take the southern route, north of Hiiumaa and around the Glotov buoy. Vessels proceeding in the opposite direction take a more northerly route, as determined by the traffic separation scheme.

Off Hanko and Hiiumaa, the route selected by passenger ferry traffic between Finland and Sweden in crossing the northern Baltic is determined by weather conditions. The southern, Sandhamn, route is preferred, the northern, Söderarm, route being used in weather conditions unfavourable for the Sandhamn route.

Passenger ferry traffic between Tallinn and Stockholm follows the northern coast of Estonia in the Gulf of Finland. The

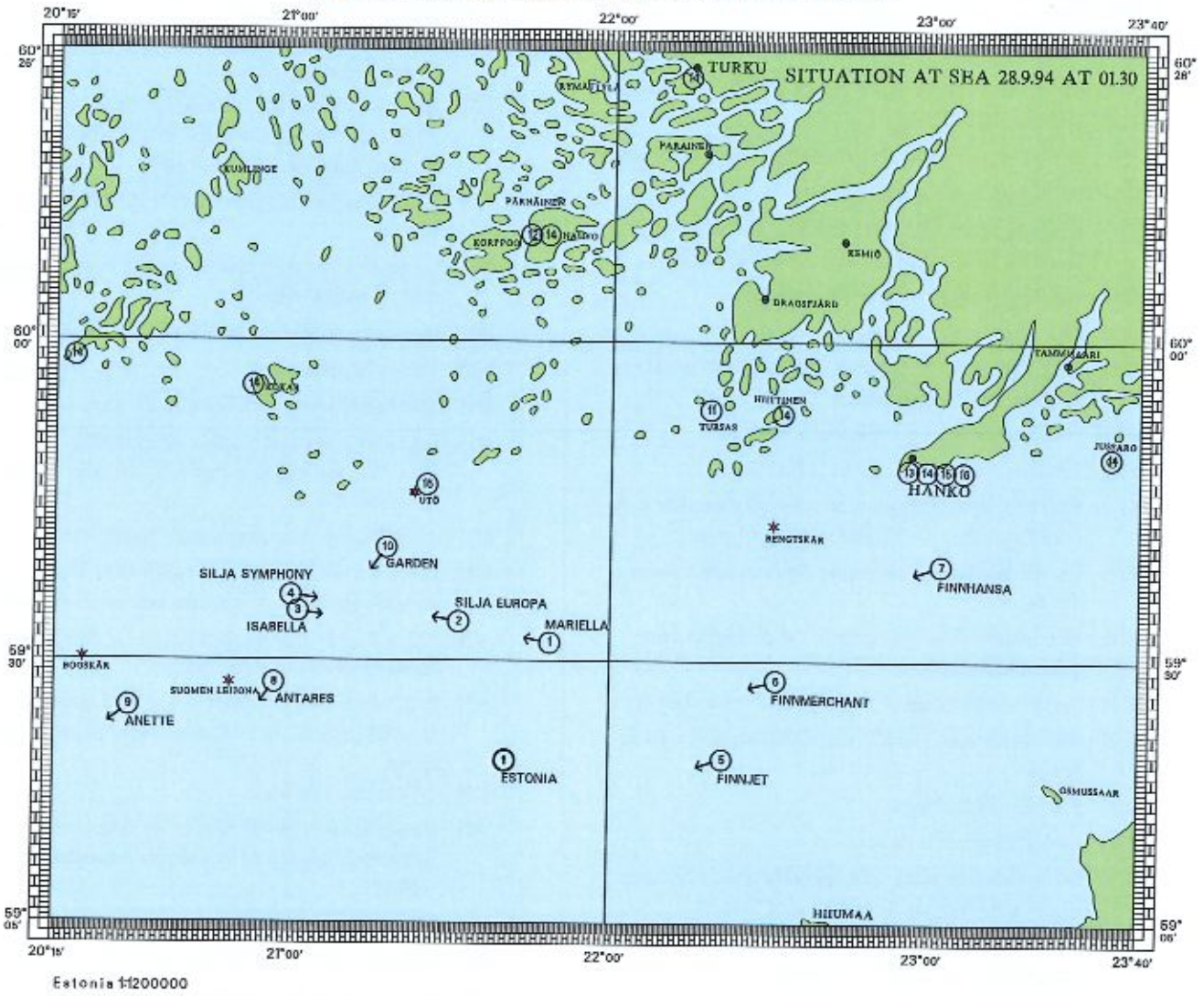
Table 7.5 Important events.

Time,	Event
0126	MRCC Turku calls MRSC Turku to verify the ESTONIA's distress call and to alert coast guard patrol vessel TURSAS.
0127	The MARIELLA calls Helsinki Radio on channel 16 and on 2182 kHz. No response.
0129	The ESTONIA notifies the SILJA EUROPA of her position. Last radio contact with the ESTONIA.
0130	MRSC Mariehamn alerts the Åland coast guard area commander.
0130	MRSC Turku alerts the TURSAS, ordered to proceed at 0137 hrs.
0131	MRSC Mariehamn verifies that MRCC Turku has received the distress call.
0132	The MARIELLA turns towards the scene of the accident.
0132	Kökar coast guard station verifies that MRSC Mariehamn has received the distress call.
0133	MRCC Turku DO alerts SDO.
0133	The FINNJET turns towards the accident site.
0134	MRSC Turku alerts the coast guard area commander.
0134	The SILJA EUROPA calls Helsinki radio on channel 16 with no response.
0135	MRCC Turku begins to transmit a message to the beepers of the stand-by crew of the Turku air patrol unit duty maritime rescue helicopter OH-HVG (Super Puma). DO spends five minutes responding to telephone calls from crew members of the alerted stand-by helicopter.
0140	SDO arrives at MRCC Turku.
0140	The SILJA EUROPA turns towards the scene.
0142	The SILJA EUROPA notifies MRCC Helsinki by mobile phone of the ESTONIA's distress call after having unsuccessfully attempted to contact Helsinki Radio on channel 16 and 2182 kHz.
0142	The MARIELLA informs Helsinki Radio by mobile phone about the ESTONIA's situation after unsuccessful attempts on channel 16 and 2182 kHz.
0144	Helsinki Radio calls the SILJA EUROPA on channel 16.
0145	MRCC Helsinki notifies Helsinki Radio of the situation and Helsinki Radio starts to prepare a Pan-Pan message. Agreed by MRCC Helsinki.
0145	MRCC Helsinki checks that MRCC Turku knows about the distress. MRCC Turku asks for a Mayday Relay to be transmitted. After that MRCC Helsinki notifies by phone Helsinki Radio to transmit a Mayday Relay.
0145	MRCC Turku requests Helsinki Radio on channel 16 to transmit a Mayday Relay.
0145	Åland coast guard area commander arrives at MRSC Mariehamn.
0146	MRCC Turku alerts the Archipelago Sea Coast Guard Section EDO.
0150	The SILJA SYMPHONY turns towards the site.
0150	Helsinki Radio begins to transmit a Pan-Pan message on channel 16 and on 2182 kHz, referring to the ESTONIA's Mayday call.
0152	MRSC Mariehamn calls MRCC Stockholm to check whether Stockholm knows about the accident. (0155 hrs according to MRCC Stockholm.)
0155	The ISABELLA turns towards the site.
0157	MRCC Stockholm calls MRCC Helsinki to offer assistance. MRCC Helsinki replies that MRCC Turku is co-ordinating the mission. MRCC Stockholm calls MRCC Turku, receives the most recent information and offers helicopter assistance. (0158 hrs according to MRCC Turku.)
0158	MRCC Stockholm alerts ARCC Arlanda and requests that all available rescue helicopters be alerted.
0200	MRCC Turku alerts the deputy commander and the commander of the maritime rescue region and of the Archipelago Sea Coast Guard Section, the latter on vacation at home in Espoo.
0203	The coast guard EDO arrives at MRCC Turku.
0205	MRCC Turku transmits on channel 16 that the master of the SILJA EUROPA has agreed to be, and has been appointed, On-Scene Commander (OSC).
0206	MRCC Helsinki notifies MRSC Hanko of the accident.
0207	Swedish stand-by helicopter Q 97 (Super Puma) alerted at Visby.
0207	MRSC Mariehamn notifies Mariehamn district dispatching centre of the accident.
0209	Swedish stand-by helicopter Y 65 (Boeing Kawasaki) alerted at Berga.
0210	Maritime inspector alerted at Turku.
0212	The MARIELLA arrives, as the first vessel, on the scene.
0215	Swedish stand-by helicopter Q 99 (Super Puma) alerted, when on another rescue mission, near southern tip of Öland.
0215	MRCC Turku reports the accident to Turku dispatching centre. Fire chief departs for MRCC Turku to participate in expert group.
0218	MRCC Turku asks MRCC Helsinki to call out stand-by helicopter OH-HVD (Agusta Bell 412) in Helsinki.
0220	Deputy coast guard section commander arrives at MRCC Turku.
0221	MRCC Helsinki alerts stand-by helicopter OH-HVD (Agusta Bell 412) at Helsinki flight group.
0222	MRCC Turku orders the vessels to make ready their helicopter pads.
0224	MRSC Mariehamn contacts air controller to report in to Mariehamn airport.
0230	MRCC Turku determines formally that the situation is a major accident and initiates appropriate alarms, e.g. alerting members of the maritime rescue region expert group.
0230	MRSC Mariehamn reports to MRCC Stockholm that the ESTONIA has probably sunk, but the information is not confirmed.
0230	OH-HVG takes off from Turku.
0230	MRCC Turku alerts the county rescue inspector to join the expert group.
0230	Turku fire chief and maritime inspector arrive at MRCC Turku.
0230	The captain of Y 65 alerts the commanding flight officer, Berga, who orders Y 74 to be readied.
0230	The SILJA EUROPA arrives, as the second vessel, at the site.
0238	Mariehamn air traffic control officer notifies ARCC Tampere of the accident.

Table 7.5 (continued)

Time,	Event
0240	The SILJA SYMPHONY arrives at the site.
0245	Swedish stand-by helicopter Y 68 (Boeing Kawasaki) alerted at Säve.
0250	Q 97 takes off from Visby.
0252	MRCC Turku requests that ARCC Tampere alerts air force helicopters.
0252	The ISABELLA arrives at the scene.
0255	MRCC Helsinki asks MRCC Tallinn how many crew and passengers are aboard the ESTONIA. (0300 hrs according to MRCC Tallinn.)
0258	ARCC Tampere alerts Finnish air force helicopters.
0300	MRCC Tallinn starts its alerting.
0302	MRCC Tallinn replies MRCC Turku; aboard the ESTONIA are 679 passengers and 188 crew members.
0305	OH-HVG arrives as the first helicopter at the scene.
0305	The county rescue inspector arrives at MRCC Turku.
0315	MRCC Turku alerts county police counsellor and commander of the patrol flight unit to join maritime rescue expert group.
0315	The helicopter flight of the transport flight squadron is alerted at Utti, Finland.
0315	MRCC Helsinki informs command centre of the Estonian border guard about the situation.
0320	Forensic physician is alerted to join maritime rescue expert group.
0320	MRCC Helsinki informs OH-HVD that ESTONIA has sunk, order for take-off.
0320	Y 65 takes off from Berga.
0320	The FINNJET arrives at the site.
0325	Deputy commander of the rescue operations requests helicopters to retrieve people from the sea to the nearest ferries.
0328	County rescue inspector informs duty officer of the Ministry of the Interior Rescue Department of the accident.
0328	County police inspector arrives at MRCC Turku.
0330	OH-HVD takes off from Helsinki.
0330	MRCC Helsinki informs the EDO at the Frontier Guard staff of the accident.
0330	MRSC Mariehamn alerts the Mariehamn police.
0330	DO at ESCO tries to contact the RAKVERE and the HEINLAND, to send them to the accident site.
0335	Forensic physician arrives at MRCC Turku.
0345	Commander of the patrol flight unit arrives at MRCC Turku.
0345	County governor informed about the accident.
0345	MRCC Stockholm orders Swedish coast guard rescue centre to have, if needed, an aircraft as air traffic controller in the area. SE-KVG aircraft in Turku ordered to take part in SAR operation.
0345	Y 68 takes off from Säve, via Berga for refuelling.
0350	Q 97, the first Swedish helicopter, arrives at the site.
0355	Q 99 takes off from Visby, after refuelling following another rescue mission.
0358	MRCC Stockholm alerts SOS Alarm centre in Stockholm and asks for hospitals to be alerted.
0358	MRCC Tallinn alerts coast guard vessel EVA-207, but she cannot depart due to the weather.
0359	MRCC Turku informs MRCC Stockholm by situation report (SITREP) no. 1 "No more assistance required, further assistance, if required, will be informed".
0400	ESCO informs that the RAKVERE and the HEINLAND are on their way.
0400	Commander of air patrol squadron informed in Rovaniemi, alerts chief of Rovaniemi patrol flight.
0400	Finnish stand-by helicopter OH-HVH alerted at Rovaniemi.
0400	Y 65 arrives at the site.
0405	MRCC Helsinki informs MRCC Tallinn on the situation.
0415	Commander of coast guard section arrives at MRCC Turku. MRCC now manned as required by the major accident rescue plan.
0415	Danish SAR offers helicopter assistance to ARCC Arlanda.
0422	Duty official at Stockholm County Council offices informs that three hospitals in the Stockholm area have been alerted.
0425	EDO at the Frontier Guard alerts chairman of Planning Commission for the Investigation of Major Accidents.
0425	MRCC Helsinki sends the SITREP no. 1 to MRCC Tallinn and the Command Centre (CC) of the Estonian Border Guard. No assistance needed.
0440	Q 99 arrives at the site.
0445	Stand-by helicopter OH-HVG takes off for Turku to pick up a second rescue man and the air operation co-ordinator to SILJA SYMPHONY.
0450	Eight vessels and four helicopters on the scene.
0500	Coast guard patrol vessel TURSAS arrives at the site.
0510	OH-HVH takes off from Rovaniemi.
0532	OH-HVD arrives at the site.
0645	Y 68 arrives at the site.
0650	Air operations co-ordinator is put on board the SILJA EUROPA to assist OSC.
0755	The FINNJET released.
0900	Last survivors found at about 0900 hrs.
0945	CSS, assistant and air traffic control officer arrive at the SILJA EUROPA.
1000	No more survivors found. Helicopters instructed to lift also bodies from the sea.
1015	OH-HVH arrives at the site.
1200	19 vessels and 19 helicopters on the scene.
1300	Air operations co-ordinator and air traffic control officer to SILJA EUROPA.
1320	Three vessels and some Swedish helicopters released.
1832	OSC informs that search is de-escalated. All merchant vessels released.

Figure 7.1 Positions of the vessels at the time of the accident.



Vessel	Type	Operator	Route	Max. no. of passengers	Gross tonnage
1. Mariella	Passenger ferry	Viking Line	Helsinki - Stockholm	2 700	48 529
2. Silja Europa	Passenger ferry	Silja Line	Helsinki - Stockholm	3 000	59 912
3. Isabella	Passenger ferry	Viking Line	Stockholm - Helsinki	2 200	34 937
4. Silja Symphony	Passenger ferry	Silja Line	Stockholm - Helsinki	2 700	58 376
5. Finnjet	Passenger ferry	Silja Line	Helsinki - Travemünde	1 686	32 940
6. Finmerchant	Cargo ferry	Finncarriers	Kotka - Lübeck		21 195
7. Finnhansa	Cargo ferry	Finncarriers	Helsinki - Lübeck		32 531
8. Antares	Cargo ferry	Finncarriers	Turku - Lübeck		19 963
9. Anette	Cargo vessel	Bror Husell Chartering	Taalintehdas - Norrköping		569
10. Garden	Cargo ferry	Engship	Turku - Harwich		10 762
11. Tursas	Coast Guard patrol vessel	Coast Guard			

Vessel	Type	Operator	Route	Max. no. of passengers	Gross tonnage
12. Halli	Oil pollution combatting vessel	Finnish Environment Institute/Finnish Navy			
Hylje	Oil pollution combatting vessel	Finnish Environment Institute/Finnish Navy			
Svärtan	Oil pollution combatting vessel	The Government of Åland			
KBV	Oil pollution combatting vessel	Swedish Coast Guard			
	Rescue boats				
	Navy and Coast Guard patrol boats	Finnish Navy and Finnish Coast Guard			
	Pilot boat	Finnish Maritime Administration			
13. Russarö	Rescue cruiser	Finnish Life-Boat Society			
14.	Various Coast Guard boats	Finnish Coast Guard			
	Various Pilot vessels	Finnish Maritime Administration			

route alternatives mentioned above are used when crossing the northern Baltic.

That night the sea traffic in the northern Baltic and in the mouth of the Gulf of Finland was lighter than normal. Because of the forecast heavy wind, fishing vessels and coasters had remained in harbour and Russian river vessels had withdrawn to protected anchorages.

All scheduled passenger ferries were at sea. At midnight the four westbound ferries, the ESTONIA included, were in their usual area at the mouth of the Gulf of Finland. Two passenger ferries were on an eastbound course north of Bogskär lighthouse. Two cargo ferries were on a westerly course south of Hanko, two cargo vessels were passing Utö lighthouse on their way south and two cargo vessels were between Hiiumaa and Bogskär.

Because of the heavy weather, the coast guard vessel from the Archipelago Sea Coast Guard Section, the TURSAS, had anchored at Örö. Twelve government vessels, three of them Swedish, had been engaged in an oil spill control exercise in the Archipelago Sea near Nauvo but were in the Pärnäinen harbour by the time of the accident. Two mine ferries belonging to the Finnish Defence Forces were near Örö, and a Navy minelayer was at Hanko.

Two coast guard vessels from the Gulf of Finland Coast Guard Section were at sea south-west of Helsinki.

Figure 7.1 shows the positions of the vessels at about the time of the accident.

7.5.2 General considerations, vessels

The masters' decisions to turn towards the scene of the accident to rescue those in distress also affected the safety of their own vessels, crews, passengers and cargoes. All the masters who received messages about the accident were faced with the same choice. Most decided to proceed to help those in distress, a few vessels received permission to continue their voyage following their request to do so, and one master decided independently not to provide assistance, since he deemed that this would seriously endanger the safety of his vessel and crew.

The first vessels to approach the scene of the accident had to decide independently how best they could help rescue people. The heavy weather prevented, or rendered inadvisable, the lowering of lifeboats or rescue boats. This decision was discussed between the masters. Each vessel prepared to rescue survivors in accordance with her own possibilities. Most lowered rope ladders down the side to the sea. While sailing to the scene of the accident the vessels were made ready to take survivors aboard.

Liferafts were lowered to the sea on wires and then raised again to bring up survivors from the ESTONIA's liferafts. The ISABELLA lowered its rescue slide, and 16 persons were pulled up along it.

In the beginning the search consisted of an attempt to find people and liferafts near the scene of the accident. As dawn broke, the participants grasped the extent of the entire rescue operation.

At 1000 hrs – when no more survivors were found – the vessels proceeded with a systematic search of the area, in formation in the direction of the calculated drift. The vessels reported any victims observed and the helicopters winched them up from the sea. The calculated area, which was patrolled from the air, was searched systematically several times.

Most of the vessels searched the whole day and were released from their duties in the evening. The FINNJET was allowed to leave at 0755 hrs to avoid additional damage caused by the heavy rolling. The ISABELLA, MARIELLA, and SILJA SYMPHONY were released at 1320 hrs. However, as more vessels arrived, the rescue capacity increased.

All merchant vessels, except the SILJA EUROPA, were released at 1832 hrs when darkness fell.

The last vessel to be released was the SILJA EUROPA which left the area at about 2030 hrs, at which time a helicopter picked up the assisting OSC and the air operation co-ordinator and their assistants. Left on the accident scene searching for bodies were government vessels. The SILJA EUROPA was relieved by the TURSAS coastal patrol vessel.

A total of 34 persons were rescued from the ESTONIA's rafts directly to other vessels; the TURSAS rescued one, the MARIELLA 15, the ISABELLA 17 and the SILJA EUROPA one.

7.5.3
Action taken by the vessels

MARIELLA

The passenger ferry MARIELLA was closest to the ESTONIA at the time of the distress signal. She had departed from Helsinki, bound for Stockholm, at 1800 hrs.

The officer of the watch was talking on the telephone with the master about reducing speed when the first Mayday call was received. On learning of the call the master went quickly to the bridge. The vessel was nine nautical miles north-east of the ESTONIA at 0132 hrs when she turned towards the site of the accident. When she was four nautical miles away, the radar image of the ESTONIA disappeared at about 0150–0155 hrs.

The MARIELLA was the first vessel to reach the assumed scene of the accident, at 0212 hrs. The master ordered an emergency stop at 0220 hrs so that no people or rafts would run foul of the propellers.

When the vessel arrived on the scene many people could be seen in the sea around the vessel, wearing lifejackets, screaming. In addition, lifeboats and rafts were floating on the surface. The vessel threw some 150 lifejackets into the water and launched four liferafts. The bunker door was opened to provide access for the rescue of persons from the sea, but it had to be closed quickly as waves washed on board.

When no people could be seen around the vessel, the master steered carefully with the starboard side to the wind, from one liferaft to the next. Most of the rafts, however, were empty.

Four open liferafts were winched down into the sea from the MARIELLA so that people on board the ESTONIA's rafts could transfer to these. One of the rafts was secured to the MARIELLA's bow and another to her stern. The area between was used to catch the ESTONIA's rafts. The rafts had to be winched manually from the sea, although two large electric drills were used at the bow to help in this work. In this way 13 persons were brought up from the ESTONIA's rafts.

Those persons on board rafts found after 0500 hrs were so exhausted that they could no longer move from one raft to another unaided. At this stage two crew members of the MARIELLA volunteered to be lowered down to her liferafts. Dressed in rescue suits and secured by rope they managed to pull two persons to their own raft, whence they were winched up to deck 8.

All in all, the MARIELLA rescued 15 persons from the ESTONIA's liferafts.

The MARIELLA continued her own rescue work until dawn, by which time the constantly worsening weather prevented her from keeping one side to the wind. She began to roll so heavily as to endanger the safety of her passengers and cargo.

The vessel turned to the wind and proceeded slowly, searching for liferafts. A report of any rafts sighted was made to the helicopters, which lifted people from the rafts and brought them to the vessels and to land-based assembly points. In this way 11 more persons were rescued, and brought by the OH-HVG helicopter to the MARIELLA at 0657 hrs. These survivors were treated by the vessel's own personnel together with three physicians and 30 nurses among the passengers.

One of the survivors was transferred by helicopter to Hanko for hospital treatment for a broken leg.

At 1320 hrs the MARIELLA received permission to continue to Stockholm. The vessel arrived in Stockholm at 2355 hrs with the 25 survivors.

SILJA EUROPA

The passenger ferry SILJA EUROPA had departed from Helsinki at 1800 hrs, bound for Stockholm. According to the ship's log and the radio log the *1st Mayday call* was received at 0120 hrs. The officer of the watch has stated that transmission was poor and he could not identify the name of the ship.

On receiving the Mayday call, the vessel was 10.5 nautical miles north-west of the ESTONIA. Ten minutes after being informed of the ESTONIA's position the master, according to the DGPS recording, started to turn to heading 134° towards the accident site. At this time ESTONIA's radar image could still be discerned. The recording shows that the distance to the ESTONIA was about 12.5 nautical miles when the turn was completed. At 0205 hrs MRCC Turku appointed the master On-Scene Commander (OSC). The SILJA EUROPA arrived at the scene at 0230 hrs.

The master summoned the command group to the bridge in accordance with the vessel's emergency plan. The group consisted of the master, the chief engineer, the chief officer, the hotel manager and the hotel purser to record the events.

By the time the vessel had turned, the radar image had disappeared. For the rest of the way to the scene, the vessel proceeded cautiously, using searchlights to scour the sea. While approaching the area, the vessel was readied for rescue operations and for taking survivors on board.

When the other passenger ferries were approaching the scene, the master, acting as OSC, allocated operational areas and followed on his radar how the vessels were proceeding to the stations allotted to them in the SAR formation. The OSC concentrated on managing the overall situation, and placed his vessel somewhat away from the others.

Two large liferafts were prepared and one of them was winched down to the sea. This, however, soon drifted away, hit by a wave that opened the locking mechanism thereby releasing it. In addition, rope ladders were lowered along the side of the vessel to the sea.

At 0448 hrs, a man who had been alone in a partially waterlogged liferaft managed to climb up a rope ladder. The vessel was steered so that the raft drifted along its side. On seeing the rope ladder reaching down to the water, the man jumped into the sea, swam to the ladder, grasped it and climbed unaided up to the sixth deck

Several liferafts found and examined were all empty. There were many lifejackets floating in the sea, many still packed. The focus of the rescue operations moved

eastwards, since the wind and the waves carried those in the water in this direction.

The OSC managed the operations of the vessels and the helicopters, passed on reports from the vessels to the helicopters and maintained contact with MRCC Turku, providing status reports and relaying instructions from MRCC to the vessels and the helicopters. An air operation co-ordinator was flown out to assist the OSC. He was put on board the SILJA EUROPA at 0650 hrs with two 5 W portable aviation radios to control the air operations. At 0945 hrs the SILJA EUROPA received the assistance of a co-ordinator surface search (CSS), his assistant and an air traffic control officer, equipped with a portable 25 W aviation radio. At 1300 hrs two more air traffic control officers boarded the vessel.

To direct the search properly, MRCC Turku telefaxed the OSC at around 0800 hrs information on the currents in the area, drift calculations and the weather forecast. On the basis of this information, the search formation was directed at 1000 hrs to proceed on a course of 100°. It turned around at 1151 hrs when the calculated limit of drift had been reached. In addition, the drift was followed on patrol flights by three maritime surveillance aircraft. The operational areas for the helicopters were determined on the basis of the results of the patrol flights. Empty liferafts were observed to drift in the strong winds considerably beyond the calculated line.

The OSC continued to manage the search until 1832 hrs, at which time all the vessels were informed in Finnish, Swedish and English that the search would be de-escalated. All were thanked for their assistance.

The SILJA EUROPA rescued one survivor. One helicopter brought five survivors and another a wounded Swedish rescue man on the vessel, which arrived in Stockholm on 29 September at 0313 hrs.

SILJA SYMPHONY

The passenger ferry SILJA SYMPHONY was on her way from Stockholm to Helsinki. At 0123 hrs she had the Suomen Leijona caisson lighthouse 6.9 nautical miles away on a bearing of 207°. The distance to the ESTONIA was about 25 nautical miles. The SILJA SYMPHONY was proceeding on a course of 97° at 21 knots.

After receiving the distress call the lookout watch on the bridge started a tape recorder, at about 0123 hrs.

At 0150 hrs the SILJA SYMPHONY changed course to 122° towards the scene of the accident, continuing to maintain full speed. The tailwind and quartering seas, coming from starboard, did not slow the speed.

The vessel reached the scene of the accident at about 0240 hrs and positioned herself upwind from the MARIELLA at a distance of about one nautical mile. She received from the OSC instructions regarding the search and the area of the search.

Liferafts hanging from the wire of a crane were lowered into the sea off the starboard side of the vessel in case one of the ESTONIA's rafts could be brought nearby; the survivors could transfer to the SILJA SYMPHONY's rafts, which could then be winched up.

At 0312 hrs the forward port slide was manned.

Four survivors, hoisted up from liferafts by a helicopter, were brought to the vessel at 0410 hrs and taken for treatment.

At 0620 hrs five survivors and at 0757 hrs eleven survivors and one body were brought on board by the same helicopter.

The SILJA SYMPHONY continued, proceeding cautiously and searching for liferafts carrying survivors. At 1320 hrs she received permission to continue to Helsinki, where she arrived at 1848 hrs with 20 survivors and one body.

ISABELLA

The passenger ferry ISABELLA was sailing from Stockholm to Helsinki. At 2400 hrs she passed the Svenska Björn caisson lighthouse at 4.4 nautical miles on a bearing of 187°.

Unlike the above-mentioned vessels the ISABELLA did not pick up the distress call from the ESTONIA. At about 0150 hrs the crew on watch saw the SILJA EUROPA change course to cross her line of course. At the same time the SILJA SYMPHONY, which was proceeding to the north of the ISABELLA, announced on VHF that she was changing her course towards the ESTONIA and would therefore have to pass ahead of the ISABELLA. On being informed that the ESTONIA was in distress, the officer of the watch of the ISABELLA turned his vessel towards the reported scene of the accident, 17 nautical miles away.

According to the ISABELLA's master, the vessel arrived at the scene of the accident at about 0252 hrs. At this time the propellers were stopped and the vessel was allowed to drift together with the MARIELLA nearby. The ISABELLA was instructed to begin the search south of the MARIELLA. While drifting the starboard side was to the wind.

At 0314 hrs the vessel winched one of her own liferafts down to the sea. The bunker door was opened, but had to be closed due to heavy seas. Ten minutes later a second raft was lowered with two voluntary rescue men from the ship. On reaching the sea they rescued a swimmer with a lifejacket. He was transferred to their raft, which was then winched up at 0445 hrs.

The next ESTONIA raft came near the ISABELLA at 0530 hrs. The master steered the vessel so that three voluntary rescue men who had been lowered in one of the ISABELLA's rafts were able to get hold of it. About 20 people on board the raft were transferred to the ISABELLA's raft. When the crew of the ISABELLA tried to winch up this raft, it was too heavy because of the number of people in it and water poured into it. The raft tore in the process and filled with water, upon which at least two of the survivors and the three rescue men fell into the sea. A helicopter called to the scene lifted up one survivor who was hanging on to a lifebuoy, and the three rescue men. All

four were brought to Hanko. At least one of the persons who had fallen into the sea disappeared. The sixteen survivors still on the damaged raft were pulled one by one up the slide and into the vessel.

A helicopter winched one survivor in deep hypothermia from the ISABELLA at 0905 hrs and flew him to a hospital in Turku.

The vessel continued her search in the vicinity of the accident site until 1320 hrs, when the OSC gave her permission to continue her voyage to Helsinki, where she arrived at 1900 hrs.

The ISABELLA rescued 17 persons of whom 16 were taken to Helsinki.

FINNJET

The gas turbine passenger ferry FINNJET departed from Helsinki for Travemünde in Germany at 1900 hrs. Her average speed was about 16 knots, and she was using her diesel engines. On receiving the Mayday call at 0124 hrs, the FINNJET was about 23 nautical miles east of the ESTONIA.

The FINNJET turned towards the scene of the accident at 0133 hrs on a heading of 276°. At first she proceeded with her diesel engines running at a speed of 15 knots, but at 0215 hrs the gas turbines were started in order to improve manoeuvrability.

According to the master's report the vessel arrived at the scene of the accident at 0320 hrs.

To keep the rolling to a tolerable level, the FINNJET proceeded at 5–7 knots during the search. When changing course, the vessel rolled so heavily that the crew feared that the cargo would start to shift. Several passenger cars shifted and were damaged, and one almost fell from the vessel's hoistable car deck.

During the search the vessel reported to the OSC three rafts containing survivors.

At the beginning of the rescue operation the officers on the bridge worked actively to get helicopters alarmed quickly and involved in the rescue. Because of the continuously worsening weather and to prevent further damage, the vessel requested permission from the OSC to continue her voyage to Travemünde. The OSC gave this permission at 0755 hrs, and it was confirmed by MRCC Turku ten minutes later.

No survivors were rescued from the sea or brought to the vessel from helicopters.

FINNMERCHANT

The cargo ferry FINNMERCHANT sailing from the Gulf of Finland to Lübeck in Germany received parts of the distress traffic. The crew called up the SILJA EUROPA at about 0145 hrs and received instructions to proceed to the scene of the accident. The vessel's speed to the scene was about 15 knots and she arrived at 0325 hrs.

On approaching, her master reported to the OSC that, because of the rough seas, the vessel would not be able to lift survivors from the water.

All liferafts observed were reported to the OSC. The first liferafts were observed already on her arrival. When the OSC asked whether any persons could be seen in the liferafts, the master tried to steer the FINNMERCHANT as close as possible to the rafts so that they could be well lit with searchlights. However, there was not enough time to examine all the liferafts in this way, since manoeuvring was difficult. When the coast guard patrol vessel TURSAS reached the scene, the two vessels worked together, the FINNMERCHANT lighting up the rafts and the more manoeuvrable TURSAS checking for survivors. The vessel continued the search throughout the entire day, and was released at 1832 hrs, at which time she continued her voyage to Lübeck.

No survivors were rescued from the sea or brought to the vessel from helicopters.

FINNHANSA

The passenger/ro-ro cargo vessel FINNHANSA, which had departed at 2000 hrs from Helsinki bound for Lübeck was south of Hanko at about 0130 hrs. Some 30 minutes later she slowed from 18 knots to 15 due to the heavy head wind and waves.

The distress radio traffic was not heard until at about 0245 hrs, when she was closing to 25 nautical miles of the scene of the accident. When her master had been called to the bridge, the course was altered towards the scene and speed increased. Because of the head wind and the high waves however, speed soon had to be reduced again to 10–12 knots. At about 0430 hrs the vessel arrived at the scene of the accident.

On approaching the scene, she was requested by the OSC to search for people in the water and rafts, locate them precisely and report these to OSC so that they could be picked up by helicopters. Several rafts were seen; most were empty, but a few were observed to hold survivors. There were also some capsized liferafts as well as water-filled or capsized lifeboats. No survivors were rescued from the sea or brought to the vessel from helicopters.

At 1832 hrs she received permission to continue her voyage to Lübeck.

TURSAS

The coast guard patrol vessel TURSAS, alerted at 0130 hrs, was ordered to proceed to the scene of the accident, where she arrived at 0500 hrs. At 0615 hrs a survivor was found on the second raft examined and brought aboard the vessel. The survivor had an injured hip and slight hypothermia. When the body temperature of the rescued person began to increase, he started to complain of pain in the hip. A helicopter was summoned to the vessel, but was unable to winch the patient aboard. At 0800 hrs a body was found in a water-filled raft, but could not be recovered to the vessel despite several attempts. (On co-operation with the FINNMERCHANT, see above.)

Towards the end of the search the TURSAS together with the minelayer UUSIMAA and the coast guard patrol vessels KIISLA and VALPAS were left in the area. The master of the TURSAS was appointed CSS at 1850 hrs. By this time the vessel had inspected 25 liferafts.

A new attempt to winch up the in-

jured person to a helicopter failed and at 1950 hrs the TURSAS got permission to take the rescued man to Hanko for medical care.

The vessel returned to sea and the master acted as CSS in the area also on 29 and 30 September, participating in the search for victims. Several bodies as well as debris were found. After this the TURSAS changed crew and continued its mission until 3 October. The TURSAS rescued one person.

MINI STAR

The cargo ship MINI STAR, proceeding from Kiel in Germany to Kotka in Finland, was 35 nautical miles SSW of the ESTONIA and arrived at the scene of the accident at about 0430 hrs. She was assigned the task of searching the area at her master's own discretion. The vessel was also instructed to go near liferafts that had been observed in order to check whether there were any people on board. At 0510 hrs motion was observed on board a liferaft. When it had been secured to the vessel with a line, two persons were seen on board. It proved impossible to bring them on board the vessel because of the heavy rolling – up to 45 degrees. Then a pilot ladder hanging down from the side was brought near the raft so that they could try to climb up. A man on board the raft failed several times to climb up. He did not understand the instructions shouted to him to wait calmly for a helicopter. When he made a new attempt, a wave washed him into the sea, where he disappeared. A helicopter arrived at 0520 hrs and brought up the second survivor from the raft.

The vessel continued its search until 1830 hrs, when she was given permission to continue her voyage to Kotka.

Final remarks

Two hours after the ESTONIA sank, 6 vessels had reached the scene of the accident. By 1600 hrs, 29 vessels had arrived to carry out a surface search. The times of arrival are given in Table 7.6.

Table 7.6 Times of arrival.

0212 hrs	MARIELLA, passenger/cargo ro-ro ferry,
0230 hrs	SILJA EUROPA, passenger/cargo ro-ro ferry,
0240 hrs	SILJA SYMPHONY, passenger/cargo ro-ro ferry,
0252 hrs	ISABELLA, passenger/cargo ro-ro ferry,
0320 hrs	FINNJET, passenger/cargo ro-ro ferry,
0325 hrs	FINNMERCHANT, ro-ro cargo,
0430 hrs	FINNHANSA, passenger/ro-ro cargo,
0430 hrs	MINI STAR, ro-ro cargo,
0500 hrs	TURSAS, patrol vessel,
0510 hrs	INGRID GORTHON, pallets carrier,
0700 hrs	UUSIMAA, minelayer,
0811 hrs	ARKADIA, bulk carrier,
0919 hrs	BREMER URANUS, general cargo,
0945 hrs	RAKVERE, general cargo,
1015 hrs	MAERSK EURO TERTIO, container ship,
1018 hrs	VALPAS, patrol vessel,
1045 hrs	CRYSTAL PEARL, tanker,
1053 hrs	MICHEL, general cargo,
1158 hrs	WESTÖN, ro-ro cargo,
1220 hrs	KIISLA, patrol vessel,
1258 hrs	BERGÖN, general cargo,
1305 hrs	FINNFIGHTER, general cargo,
1349 hrs	PETSAMO, general cargo,
1415 hrs	UISKO, patrol vessel,
1427 hrs	NAVIGIA, general cargo,
1431 hrs	BALANGA QUEEN, passenger/cargo ro-ro ferry,
1455 hrs	CORTIA, ro-ro cargo,
1458 hrs	RANKKI, tanker,
1502 hrs	TIIRA, tanker.

7.5.4 General considerations, helicopters

Readiness

Three helicopters in Finland and four in Sweden had been on stand-by. These were the first to be summoned. In addition, Denmark had two helicopters on stand-by under an agreement to assist in Swedish SAR operations when necessary.

Both in Finland and in Sweden the crews of the helicopters were on stand-by at their homes. The requirement in Sweden is that the helicopter has to take off within the stipulated readiness period. The requirement in Finland is that the crew is obliged to arrive at the base within the readiness period. In practice, Finnish helicopters are also able to take off within this period.

Planning of action

At 0325 hrs the deputy commander of the rescue operation determined as the principle for the use of the helicopters that they would retrieve people from the sea and from the rafts and take them to the nearest passenger ferries. This was intended to optimise use of the helicopters and minimize transfer flights.

The Finnish helicopters OH-HVG and OH-HVD landed on the passenger ferries, but the other helicopters took the rescued survivors to land-based locations. Landing on heaving and rolling ferries was considered too dangerous. The pilot of OH-HVG stated that landing on the ferries was the most difficult part of the whole rescue operation.

The medical executive team at MRCC Turku immediately started to raise medical readiness and decided at 0245 hrs to send a team headed by a physician to the coastal island fortress of Utö, the closest island to the scene of the accident. However, no helicopters were available for transport, so a team headed by a physician was sent from Mariehamn to Utö at 0620 hrs.

When it became clear that not all the rescued survivors could be carried to the vessels, MRCC Turku gave instructions to bring them to Utö as necessary. The reasons were that the flight time would be shorter and the risk of hypothermia less. Utö thus became the most important assembly point for survivors, of whom the helicopters brought 24 to the fortress for transfer to hospital care. The fortress personnel, guided by nurses, attended to the survivors' treatment. The medical team arrived at Utö at about 0650 hrs.

The use of Utö as an assembly point became more difficult by 0630 hrs when the supply of helicopter fuel ran out. Helicopters were advised to fly to Nauvo, Turku or Hanko for refuelling. MRCC Turku ordered hospitals to prepare to

Table 7.7 Helicopter operations.

Super Puma:

OH-HVG, OH-HVF, Q 97, Q 99, Q 91, 0 95, 0 98

Boeing Kawasaki:

Y 65, Y 64, Y 74, Y 69, Y 68, Y 61, Y 75, Y 72 Y 76

Agusta Bell 412:

OH-HVD, OH-HVH

Designation Type	Nationality Operator Base	Primary function	Crew	Status of rescue men	Capacity	Alert time/Readiness Alerter How alerted	Take-off time Arrival time	Recovered Survivors	Dead
OH-HVG Super Puma	FIN Frontier Guard Turku	Control and guarding of frontiers	Pilot, Co-pilot, 2 Mechanics, 2 Rescue men (1 on first flight)	Regular officers or frontier guards	15 - 20	0135, 1 hour MRCC Turku General alarm to the beebers of crew members at home	0230 0305	44	11
Q 97 Super Puma	SWE Air Force Visby	Air and sea rescue	Pilot, Co-pilot, Navigator, Mechanic, Rescue man	Conscript	15 - 20	0207, 1 hour ARCC Arlanda Telephone	0250 0350	15	-
Y 65 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, Tactical officer, Mechanic, Rescue man (3 on 2nd flight)	Regular officers	20 - 25	0209, 2 hours ARCC Arlanda Telephone, Paging system malfunctioned	0320 0400	1	3
Q 99 Super Puma	SWE Air Force Ronneby	Air and sea rescue	Pilot, Co-pilot, Navigator, Mechanic, Rescue man	Conscript	15 - 20	0215, 1 hour ARCC Arlanda Radio	0355 0440	9	-
OH-HVD Agusta Bell 412	FIN Frontier Guard Helsinki	Control and guarding of frontiers	Pilot, Co-pilot, 2 Mechanics, 2 Rescue men	Frontier guards	5 - 7	0218, 1 hour MRCC Turku Telephone	0330 0532	7	14
Q 91 Super Puma	SWE Air Force Ronneby	Air and sea rescue	Pilot, Co-pilot, Navigator, Mechanic, Rescue man	Conscript	15 - 20	0220 ARCC Arlanda Telephone	0345 0550	6	-
Y 64 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, Tactical officer, Rescue man, Mechanic	Regular officer	20 - 25	0230 O/C squadron Helicopter Div. Telephone	0445 0552	1	-
Y 74 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, Tactical officer, Mechanic, 1 or 2 Rescue men	Regular officers	20 - 25	0330 O/C squadron Helicopter Div. Telephone	0546 0642	6	5
Y 69 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, Tactical officer, Mechanic, 2 Rescue men	Regular officers	20 - 25	0247 ARCC Arlanda Telephone	0430 0645	-	6
Y 68 Boeing Kawasaki	SWE Navy Säve	Anti submarine warfare	Pilot, Co-pilot, Mechanic, Tactical officer-Rescue man, Rescue man, Telegraphist	Regular officers	20 - 25	0245, 1 hour ARCC Arlanda Telephone	0345 0645	6	3
0 95 Super Puma	SWE Air Force Söderhamn	Air and sea rescue	Pilot, Co-pilot, Navigator, Mechanic, Rescue man	Conscript	15 - 20	0245 ARCC Arlanda Telephone	0410 0645	6	3
OH-HVF Super Puma	FIN Frontier Guard Turku	Control and guarding of frontiers	Pilot, Co-pilot, 2 Mechanics, 2 Rescue men	Frontier guards	15 - 20	0345 Chief of the Turku patrol flight Telephone	0615 0645	-	15

Table 7.7 (continued)

MI-8:

X 92, X 42, X 62, X 82

MI-2:

ES-XAC

Sea King:

U 280, U 277

Designation Type	Nationality Operator Base	Primary function	Crew	Status of rescue men	Capacity	Alert time/Readiness Alerter How alerted	Take-off time Arrival time	Recovered Survivors	Recovered Dead
X 92 MI-8	FIN Air Force Utti	Military Transport	Pilot, Co-pilot, 2 Mechanics, Rescue man	Regular officer	16 - 24	0315 ARCC Tampere Telephone	0438 0650	-	13
X 42 MI-8	FIN Air Force Utti	Military Transport	Pilot, Co-pilot, 2 Mechanics, 2 - 3 Rescue men	Fire men	16 - 24	0315 ARCC Tampere Telephone	0445 0700	3	13
X 62 MI-8	FIN Air Force Utti	Military Transport	Pilot, Co-pilot, 3 Mechanics, 2 Rescue men (from the beginning of 2nd flight)	Fire men	16 - 24	0315 ARCC Tampere Telephone	0510 0720	-	1
U 280 Sea King	DK Air Force Aalborg	Sea rescue	Pilot, Co-pilot, Mechanic, Telegraphist - Rescue man, Mechanic - Rescue man	Regular officers	15 - 20	Offered assistance at 0417, 1 hour	0455 0815	-	-
U 277 Sea King	DK Air Force Vaerlose	Sea rescue	Pilot, Co-pilot, Mechanic, Telegraphist - Rescue man, Mechanic - Rescue man	Regular officers	15 - 20	Offered assistance at 0417, 1 hour	0508 0815	-	-
OH-HVH Agusta Bell 412	FIN Frontier Guard Rovaniemi	Control and guarding of frontiers	Pilot, Co-pilot, Mechanic, 1 - 2 Rescue men	Frontier guards	5 - 7	0400, 1 hour Commander of patrol squadron Telephone	0510 1015	-	4
Y 61 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, Mechanic, Tactical officer 2 Rescue men	Regular officers	20 - 25		1030 1140	-	-
ES-XAC MI-2	EST Aeroco Tallinn	Observation	Pilot, Co-pilot, Observer		6	0730 National Rescue Board Telephone	1145 1405	-	-
Y 75 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, Mechanic, 2 Rescue men	Regular officers	20 - 25		1300 1410	-	2
X 82 MI-8	FIN Air Force Utti	Military transport	Pilot, Co-pilot, 2 Mechanics, Rescue man, 3 -7 Firemen	Regular officer, Firemen	16 - 24		1226 1525	-	-
0 98 Super Puma	SWE Air Force Söderhamn	Air and sea rescue	Pilot, Co-pilot, Navigator, 2 Extra pilots, 2 Mechanics, 3 Rescue men	Conscripts	10 - 15	1100 ARCC Arlanda Telephone	1155 1505	-	-
Y 72 Boeing Kawasaki	SWE Navy Berga	Anti submarine warfare	Pilot, Co-pilot, 2 Rescue men, Mechanic	Regular officers	20 - 25		1500 1700	-	5
Y 76 Boeing Kawasaki	SWE Navy Säve	Anti submarine warfare	Pilot, Co-pilot, Mechanic, Tactical officer, Rescue man	Regular officer	20 - 25		1600 1800	-	-

receive patients, and ground transport was organised from the refuelling sites to the hospitals. Helicopters arriving in Turku for refuelling landed first at the Turku University Central Hospital landing site to leave the survivors before proceeding to the base for refuelling.

OSC continuously advised the helicopters regarding the refuelling sites. Their crews could assume that the ground transport of survivors from the refuelling sites had been arranged.

Action

Up to 0600 hrs four rescue helicopters operated in the area and four more arrived at dawn, somewhat before 0600 hrs.

At the break of day the operational possibilities for the helicopters improved, and liferafts were found more quickly and easily than in the dark using searchlights.

The last survivors were found at about 0900 hrs. At about 1000 hrs the helicopters were instructed to lift also bodies observed and reported by the vessels.

On the same day, by 1330 hrs, all liferafts had been examined. After this, seven Finnish and three Swedish helicopters remained at the scene. The others were released from duty to return to their bases.

On the day of the accident, 26 helicopters participated in the rescue operation and search for bodies. Of these eight came from Finland, 14 from Sweden, one from Estonia, two from Denmark and one from the Russian Federation. In addition five helicopters served as logistical support, e.g. by transporting first-aid personnel.

The helicopters continued their search and retrieval until dark, when the search was broken off and they returned to their bases. The helicopters operated in the area for about 15 hours, from 0305 hrs to 1800 hrs.

The search for and retrieval of bodies and objects in the water continued until 2 October, after which searches continued in connection with the regular patrol flights of aircraft and helicopters.

The helicopters rescued 104 persons and found 92 bodies within the first days. The correct number of bodies, 92, differs slightly from the total obtained by summing the numbers of bodies given by the pilots.

Section 7.5.5 describes the results of the helicopter operations up to the evening of 28 September in the order in which the helicopters first arrived at the scene of the accident. The search for the deceased on the following days is dealt with only briefly. Additional data about the helicopter operations are given in Table 7.7.

Maintenance

At 0300 hrs MRCC Turku sent a tank truck to Nauvo to establish a refuelling site for helicopters. Later during the morning a tank truck was also sent to Hanko to replenish the supply there.

Utö had a permanent refuelling facility for maritime rescue helicopters. The oil spill exercise that had been conducted during the previous evening had depleted this, however, and a new supply did not arrive until the following day. Meanwhile, the refuelling took place in Hanko and Nauvo.

At 1000 hrs the Hanko fuel supply was exhausted and later during the morning a tank truck was sent there.

Meals for the helicopter crews had also been arranged at the refuelling sites.

7.5.5 Action by SAR helicopters

OH-HVG (Super Puma)

The stand-by helicopter OH-HVG, taking off at 0230 hrs from Turku and arriving at the scene of the accident at 0305 hrs, began its search in the darkness, using its searchlights to locate people in the water.

During its first rescue flight OH-HVG inspected four liferafts and rescued four persons, who were taken to the SILJA SYMPHONY.

The crew of OH-HVG noted that the darkness made it difficult to see people floating in lifejackets even if searchlights were used. The use of only one rescue man proved to be slow and dangerous, and at 0445 hrs OH-HVG flew to Turku to pick up a second rescue man. On the same trip, it flew the air operations coordinator to the scene.

During the second flight, from 0515 hrs to 0915 hrs, several rafts were inspected. Forty survivors were rescued, and one body was retrieved. Of the survivors 11 were flown to the MARIELLA, 16 to the SILJA SYMPHONY and 13 to Nauvo. In Nauvo they were met by a physician and ambulances. The survivors were taken to a health centre and from there the ten worst cases were taken to hospital.

During its third flight, from 0930 hrs to 1230 hrs, OH-HVG inspected 25 rafts, but only dead people were found.

After a change of crew, and maintenance of the helicopter, OH-HVG transported representatives of the media to the scene of the accident and to Utö, and then back to Turku.

During the fourth search mission, from 1600 hrs to 1915 hrs, bodies were retrieved from liferafts and from the sea. After this flight, OH-HVG flew back to Hanko. On its return flight from Hanko to Turku, from 1950 hrs to 2100 hrs, OH-HVG flew by way of the scene of the accident in order to carry out a search.

During the following two days OH-HVG was engaged in search operations and picking up bodies. In several statistics published after the accident, the number of survivors rescued by OH-HVG has been given as 37. This number has also been reported by the crew. In reality the helicopter rescued 44 people. This has been verified from the vessels' and the Nauvo assembly point log books.

Q 97 (Super Puma)

The Swedish stand-by helicopter Q 97 took off from Visby at 0250 hrs, arriving at the scene of the accident at 0350 hrs. The OSC requested the helicopter to pick up as many people as possible from the sea.

On its first flight Q 97 rescued six

survivors from the keels of two upside-down lifeboats. As instructed by the OSC, Q 97 flew them to Utö, where it landed at 0500 hrs. During the stop the crew called ARCC Arlanda, informing about the situation at the scene and asking for as many helicopters as possible.

After refuelling, Q 97 returned at 0540 hrs to the scene and rescued nine survivors, five from a liferaft and four from the water. They were in very poor condition. The pilot decided to take them directly to Hanko on the mainland. Q 97 landed at a sports field in Hanko at 0735 hrs, and local residents quickly summoned ambulances to the field. The crew was advised to fly to the Hanko coast guard station landing field, where they could refuel.

Q 97 took off from Hanko for the accident scene at 0810 hrs and returned to Hanko at 1050 hrs. After refuelling Q 97 returned to its base and finished the mission at 1615 hrs.

Y 65 (Boeing Kawasaki)

The Swedish stand-by helicopter Y 65 took off from Berga at 0320 hrs. Because the MBS system was shut down that night due to a malfunction, the alerting of the crew was delayed ten minutes. When the pilot heard from Berga that the ESTONIA had presumably sunk, he decided to fly directly to the scene of the accident without, according to routines, picking up medical personnel from Huddinge Hospital.

On arriving at the scene of the accident at 0400 hrs, Y 65 observed a large number of liferafts to the east of the SILJA EUROPA and began to inspect them. The first two were empty. At this stage a red emergency flare was fired in front of the helicopter. People on board a raft were flashing lights and waving. Because of the heavy sea, it was difficult to lower a rescue man to the raft, but the helicopter succeeded in rescuing one person from the raft.

When the helicopter started to lift the two remaining survivors, one of the strands of the wire broke, and then the winch engine malfunctioned. Since there were no mountings on the helicopter for an emergency winch, winching the survivors up to the helicopter was impossible and they had to be left in the raft. The rescue man had to be carried at the end of a 30–40 metre wire to the deck of the SILJA EUROPA. Y 65 alerted Berga for a new winch and took the survivor to hospital in Stockholm, from where one nurse was taken on board to assist in the rescue work. After this, Y 65 proceeded to Berga to change the winch and wire.

After taking on board two rescue men along with a reporter and a cameraman from a Swedish TV company, Y 65 took off again for the scene of the accident at 0812 hrs. During its second flight it inspected a large number of liferafts and hundreds of empty lifejackets. No more survivors were found. Several bodies were observed and Y 65 informed other helicopters. Three bodies were retrieved and flown to Hanko, where Y65 arrived at 1137 hrs. After refuelling, Y 65 returned to Berga, arriving at 1550 hrs.

Q 99 (Super Puma)

When Q 99, the stand-by helicopter at Ronneby received the alarm, it was already on another rescue mission just south of Öland, where it rescued two survivors from a fishing vessel. This mission finished at 0238 hrs. Ordered immediately to proceed to the scene of the accident, Q 99 landed at 0325 hrs at Visby for refuelling and maintenance of equipment and took off from Visby at 0355 hrs, reaching the scene of the accident at 0440 hrs.

During its first flight Q 99 launched two of its rafts so that they could drift into the area. Three survivors were winched up from a raft. Two more survivors were hoisted into the helicopter from another raft. Q 99 then had to break off as the rescue man was exhausted.

Q 99 proceeded to Utö where it landed at 0547 hrs. After refuelling from the last reserves of fuel on Utö, Q 99 returned at 0651 hrs to the scene of the accident and discovered a raft with four people. While winching up the first survivor a huge wave of about 12 m high almost overturned the raft. After winching all four persons up, the crew returned to Hanko due to the bad condition of the rescued people.

Q 99 carried out one more search flight between 0831–1125 hrs but could not find any more survivors or bodies. After refuelling at Hanko, Q 99 departed for base, arriving at 1610 hrs.

OH-HVD (Agusta Bell 412)

OH-HVD was on stand-by at its base in Helsinki. At 0218 hrs MRCC Turku asked MRCC Helsinki to call out OH-HVD. The crew were alerted at 0225 hrs in their homes. They arrived at 0255 hrs at the base and reported to MRCC Helsinki, which responded that MRCC Turku was in charge of the rescue operation and that they would be given their assignment as soon as MRCC Turku and MRCC Helsinki had clarified the situation. At 0320 hrs MRCC Helsinki reported that the ESTONIA had sunk and ordered OH-HVD to take off. The helicopter arrived at the scene of the accident at 0532 hrs.

When OH-HVD reported to the OSC on arriving at the scene of the accident it was assigned the task of retrieving survivors from the rafts and from the sea, where 20–30 liferafts, 2–3 lifeboats and many lifejackets could be seen in the water.

OH-HVD began to inspect the liferafts. Four survivors found on board the third raft were flown to the SILJA EUROPA. After this OH-HVD continued to inspect rafts, and soon a badly injured person was found on one of them. He was also taken to the SILJA EUROPA. The other persons on the raft were dead.

OH-HVD continued inspecting rafts for twenty minutes. The FINNMERCHANT had observed survivors on a raft near by, and OH-HVD was summoned. Two survivors in good condition were found on the raft, and they were flown to Hanko, where the helicopter refuelled.

OH-HVD returned to the scene of the accident at 0800 hrs and found five bodies in lifejackets in the water.

During the day OH-HVD continued search operations – only broken off for

refuelling – until 1945 hrs. The following day it continued its flights until dusk and recovered nine bodies from the sea.

Q 91 (Super Puma)

Q 91 took off from Ronneby at 0345 hrs and reached the scene of the accident at 0550 hrs.

At the beginning of the operation Q 91 launched two liferafts into the sea. It began to search an area 7–8 km to the west of the search areas of the other units. Several rafts with survivors were found at the beginning of the search. The helicopter winched up five survivors from one raft. From the next raft, one survivor was winched up. The attempt to winch up a second person failed. He was in a state of panic and almost drowned the rescue man. The winching had to be halted. Q 91 took the survivors to Utö, and on hearing that there was no more fuel available there, proceeded to Mariehamn.

During the flight the helicopter's equipment gave two chip warnings (a warning of metal chips in the transmission system). Q 91 landed safely in Mariehamn but had to leave the operation because of the failure.

Y 64 (Boeing Kawasaki)

Y 64 took off from Berga at 0445 hrs, picked up a physician and a nurse from Huddinge Hospital and arrived at the scene of the accident at 0552 hrs.

The crew noticed that many rafts were searched more than once because there were no markings showing that a raft already had been examined. Therefore the crew proposed by radio that the rescue men should cut up the canopies of searched rafts.

Y 64 began to rescue three people, one in a raft, one lying in the water tied to the raft and one lifeless entangled in the raft's sea anchor. The helicopter winched down its rescue man to the person in the water. Although the winch wire failed, the rescue man managed to raise him. The next to be lifted up was the man in the raft. He was not wearing a lifejacket. He fell into the water just before gaining the helicopter. The rescue man jumped after him and succeeded in grasping him. The winch now failed totally and another helicopter, Y 74, was called upon to rescue them. However, before Y 74 arrived, the person died.

Y 64 brought the survivor to Utö. The medical personnel on board were left to assist the Finnish nursing staff. As requested by the staff, Y 64 transported 20 survivors from Utö to Turku University Central Hospital. After this Y 64 got permission from the OSC to return to Berga to repair the broken winch, and landed there at 1530 hrs.

Y 74 (Boeing Kawasaki)

Y 74 took off from Berga at 0546 hrs. Carrying a physician and a nurse from Huddinge Hospital, Y 74 reached the scene of the accident at 0642 hrs. Dawn had already broken. At the beginning of the operation, Y 74 found a raft containing a body with the head under water. At the same time the helicopter received a radio message that Y 64 had had to leave its rescue man in the sea. Y 74 went to assist Y 64.

Y 74 had difficulties in locating Y 64 since the OSC lacked exact information on the position of each helicopter. The Y 64 rescue man was holding onto a body, which was winched up to Y 74 with the assistance of Y 74's own rescue man. When the body had been recovered, the Y 74's rescue man fell about one metre, receiving a heavy blow from the harness to the lower part of his body. Nonetheless, he requested that he be lowered to bring up one more body. This body, however, had become badly tangled with the ropes on the raft and could not be winched up.

At this stage the pilot decided to interrupt the recovery of the body, since there might still be survivors in the sea and on rafts. Finally a spare harness was lowered to the Y 64's rescue man and used to winch him up to the helicopter. The injury to the Y 74 rescue man proved so serious that he was unable to do more. The work was continued by Y 64's rescue man.

At 0715 hrs Y 74 found a raft with three survivors, who were winched up into the helicopter. At one point the rescue man had to be brought up because his flippers had been torn off by the waves.

At 0740 hrs Y 69 reported that it, too, had had to leave its rescue man in the water because of a malfunction of the winch. In addition, this rescue man was suffering from concussion, since he had hit his head on a lifeboat that was upside-down in the water.

Y 74 went to Y 69's assistance. A hook and harness were dropped to the rescue man, and he was able to use them to get up to the helicopter.

Three survivors were hanging on to the keel of an upside-down lifeboat. Y 64's rescue man was lowered, and all three survivors were winched up. In connection with the rescue of the last of the three, a strong wave threw the rescue man against the lifeboat, injuring him. Since Y 74 now had three injured rescue men, it had to interrupt its rescue operations. In addition, fuel was running low. The six survivors, the injured rescue men and the body were taken to Huddinge Hospital, where the helicopter arrived at 0930 hrs. Y 74 returned to Berga at 0940 hrs to change crew.

Y 74 took off again from Berga at 1025 hrs with a new mechanic and two new rescue men. A fresh physician and nurse were taken on board from Huddinge Hospital. On reaching the scene of the accident, the helicopter recovered four of the five bodies on a liferaft. The fifth, which was not wearing a lifejacket, was washed overboard and disappeared in the waves.

Y 74 was then assigned a search area along the southern edge of the scene of the accident, but did not observe anything related to the accident. Y 74 proceeded to Hanko for refuelling. While in Hanko the helicopter was informed by ARCC Arlanda that it did not need to continue the search. The helicopter returned to Berga, landing at Utö on the way to leave the bodies. It landed at Berga at 1657 hrs.

Y 69 (Boeing Kawasaki)

Y 69 took off from Ronneby at 0430 hrs. On reaching the scene of the accident at 0645 hrs, Y 69 reported to the OSC and was ordered to wait. At the same time, it observed a raft which, however, proved to be empty. Immediately after this an upside-down lifeboat came into view, with three persons hanging on to its keel. When the rescue man was lowered into the water, a strong wave washed him against the boat, injuring him in the head. When the helicopter tried to winch him up, the winch malfunctioned. Y 69 had to ask Y 74 for assistance. Y 74 was able to bring up the rescue man and the three survivors.

Since the OSC could not assign the winchless helicopter additional tasks, Y 69 left for Mariehamn.

For the remaining period Y 69 served as a reconnaissance and transport helicopter from Turku. It ended its mission in the afternoon and landed at Berga at 1530 hrs.

On the following day Y 69 carried out search operations at the scene of the accident with a crew transferred from Y 72. Six bodies were recovered.

Y 68 (Boeing Kawasaki)

The stand-by helicopter Y 68 took off from Säve at 0345 hrs, arriving at Berga for refuelling at 0515 hrs and reaching the scene of the accident at 0645 hrs.

Immediately on arrival Y 68 found an upside-down liferaft carrying six survivors and five bodies. The six were winched up. The winching was very difficult, since the raft bobbed up and down in the waves, and the wire was in danger of being jerked. The survivors were suffering badly from hypothermia, and since no rafts or persons swimming in the sea could be seen near by, the pilot decided to fly the survivors as quickly as possible to receive medical care.

Y 68 was aware that Q 91 (see above), which left the area at the same time, was experiencing technical difficulties and was en route to Mariehamn. To ensure that Q 91 made it safely, Y 68 decided to proceed to Mariehamn also. On the way, Y 68 asked to be met by six ambulances to take care of the survivors.

After refuelling, Y 68 returned to the scene of the accident to perform a second search flight. During this flight it only found one body, which was floating in a lifejacket. At the end of the flight, the body was flown to Nauvo.

After refuelling at Nauvo, Y 68 took off on a third rescue flight. It retrieved two bodies from the sea and took them to Turku. After refuelling, Y 68 returned to Berga where it landed at 1640 hrs.

On the following day, Y 68 flew with a new crew from Berga to Turku. It was assigned, together with a Finnish helicopter, to fly media representatives to the scene of the accident between 1200 hrs and 1900 hrs. During the flights Y 68 was requested to patrol the sea, but no survivors or bodies were found.

O 95 (Super Puma)

O 95 took off from Söderhamn at 0410 hrs for Berga where it landed at 0510 hrs for briefing and refuelling. At 0600 hrs O 95 took off and on arriving at the scene of the accident at 0645 hrs, O 95 immediately observed many liferafts and lifejackets in the water. By 0720 hrs the helicopter had brought up six survivors from two different rafts. After this O 95 flew to Utö to drop off the survivors. From Utö, it proceeded to Turku for refuelling.

On its second rescue flight, from 0925 hrs to 1210 hrs, O 95 was assigned a search area along the eastern area of the scene of the accident. The helicopter inspected several liferafts, but no more survivors were found. Three bodies were winched up to the helicopter and taken to Hanko.

On its third flight no more bodies were found. O 95 returned for its base in Söderhamn at 1530 hrs by way of Hanko and Berga.

OH-HVF (Super Puma)

OH-HVF was at its base in Turku, but it had been stripped down for its regular maintenance. When the chief of the Turku patrol flight arrived at MRCC Turku at 0345 hrs, he had the helicopter prepared for operations. At 0540 hrs the inspector certified that the helicopter was airworthy for the duration of the rescue operations.

OH-HVF took off at 0615 hrs and arrived at the scene of the accident at 0645 hrs. Unable to make radio contact with the air operations co-ordinator, it called OH-HVG, which was in the area, and was instructed to winch up survivors from the liferafts. OH-HVF inspected several rafts, but all were empty. The best approach proved to be to lower a rescue man to the sea down-wind, from where he could swim to the rafts. A body was on one raft. When an attempt was made to place the body in the hoist, a large wave capsized the raft and she disappeared.

At this stage OH-HVF departed for Nauvo to refuel. It arrived at Nauvo at 0935 hrs. It took off again for the scene at 1025 hrs, arriving there at 1045 hrs.

OH-HVG notified OH-HVF of a raft carrying several bodies. OH-HVF found an overturned raft with 12 bodies. Nearby two rafts had become entangled in each others' ropes, and two bodies were attached to the ropes. OH-HVF brought up eight bodies from the over-turned raft. The winch wire was then found to be frayed. OH-HVF notified the OSC of this and flew to Utö, where it landed at 1200 hrs. No more fuel was available at Utö. In addition, the wire was so badly frayed that it had to be replaced. OH-HVF took off from Utö at 1245 hrs, carrying a new air operations co-ordinator and the air traffic control officer to the SILJA EUROPA. On the way one more liferaft was checked by the rescue man, and several more visually. From the SILJA EUROPA, OH-HVF returned back to the base and landed in Turku at 1355 hrs.

A second crew took off from Turku to the scene of the accident at 1535 hrs, taking with them two police investigators to Utö. OH-HVF searched for survivors and bodies at the scene of the accident for 1.5 hours, but no more were found. The helicopter landed at Hanko at 1855 hrs. Later that evening, OH-HVF transported six persons who had part-

icipated in the rescue operations from the SILJA EUROPA to Turku.

On the next day OH-HVF carried out one further search flight, during which it brought up seven bodies. It served also in transport duties.

X 92 (Mi-8)

Together with the other Finnish Air Force Mi-8 helicopters X 92 was called out at 0315 hrs. It took off from Utti at 0438 hrs, refuelled at Turku, and arrived at the scene of the accident at 0650 hrs.

On arrival X 92 was assigned a search sector by the air operations co-ordinator, and asked to search the liferafts for survivors. The rescue man inspected several rafts, but all were empty. After this the crew was advised that the inspected rafts were to be marked with a buoy or by ripping open the canopy. During the first flight, no survivors were found, but a large number of bodies were observed.

At the end of its first flight X 92 picked up one survivor on a stretcher from the MARIELLA and took him to Hanko. The assignment to pick up another survivor from the ISABELLA had to be transferred to X 42, since it would have taken some time to get him up on deck, and X 92 was running low on fuel.

After landing in Hanko, X 92 returned to the scene of the accident and picked up eight bodies, which were taken to Utö. Following refuelling at Nauvo, a third search flight was carried out but no more survivors or bodies were found.

On the following day X 92 flew one flight to the scene of the accident to transport journalists.

On 30 September X 92 performed three search flights and picked up five bodies from the sea. Three of them lacked lifejackets. The helicopter returned to Utti at 1943 hrs.

X 42 (Mi-8)

X 42 took off from Utti at 0445 hrs, landed in Turku to refuel and took on board seven men from the special task group (EKA) of the Turku city fire department to serve as rescue men. They could not board the SILJA EUROPA because the vessel was rolling so badly that it would have been dangerous to land on the helicopter deck. They therefore stayed with the helicopter all day as first-aid personnel.

Some 50 rafts could be seen in the water. Flying low, X 42 examined them visually. A rescue man was lowered to check those with intact canopy. He searched ten rafts, but no survivors were found.

While X 42 was inspecting the rafts, OH-HVG reported that it had to interrupt a rescue from one raft, since it was low on fuel. X 42 winched three survivors from this raft. It then flew to the ISABELLA to pick up a survivor in a stretcher who, together with the other survivors, was flown to Turku.

During its second flight X 42 took on board three EKA men to serve as rescue men and to operate the winch. On a search in the area indicated by the OSC, X 42 brought up two bodies from lifeboats.

After taking three bodies from Hanko to Utö, X 42 returned to the scene of the accident and brought up four more from the sea. The bodies were taken to Utö, and X 42 returned to Turku at 1803 hrs.

On the following day X 42 carried out several search flights and picked up seven bodies from the sea. It returned to base at 2144 hrs.

X 62 (Mi-8)

X 62 took off from Utti, landed in Turku and arrived at the scene of the accident at 0720 hrs. It reported in to the SILJA EUROPA by radio. Since X 62 carried no rescue man, it was assigned only search operations. At 0735 hrs X 62 was ordered to transport physicians from Turku to Utö. On the way to Turku, it was also requested to transport firemen from Turku to Utö, and the CSS from Nauvo to the SILJA EUROPA.

X 62 took off from Turku at 0841 hrs with five physicians, six firemen/rescue men and an air traffic control officer. The CSS was picked up in Nauvo. The physicians and the firemen were dropped off in Utö. The flight continued to the SILJA EUROPA where, however, it proved impossible to land, as the stern deck of the vessel was rising and falling about 10 metres at a time. Those who were supposed to have been landed on the vessel had to be winched down to the deck. Before the last person could be lowered, a dangerous situation arose when wind turbulence caused by the shape of the vessel almost caused X 62 to strike the helicopter deck. The last person could not be winched down until the vessel had been turned.

After this X 62 began to search the sea for survivors, and possible oil spill from the ESTONIA. It soon found a small slick. Some 20 to 30 bodies in lifejackets were floating flat in front of the bow of the SILJA EUROPA, but no survivors could be seen.

X 62 returned to Turku to refuel and back to the scene of the accident at 1244 hrs. Two firemen/rescue men from the Helsinki Fire Department were taken on board at Utö. At the scene of the accident, X 62 began to inspect rafts, and one overturned lifeboat. One body was brought up from a raft.

During the rescue work, one of the two rescue men was injured when the hook of the winch tore through his clothes and gouged his thigh. The work was broken off, and the injured rescue man had to be flown to Hanko for medical treatment. X 62 arrived at Hanko at 1528 hrs.

X 62 performed one more search flight, from 1600 hrs to 1900 hrs, but no more survivors or bodies were found. On the following day X 62 carried out one sortie, but again no more survivors or bodies were found.

U 280 (Sea King) and U 277 (Sea King)

After refuelling in Visby U 280 and U 277 flew together and arrived at the scene of the accident at 0815 hrs.

The OSC assigned them a search area and they operated together. No survivors were found during the rescue flight, and at this stage no action was taken to raise bodies from the water. They flew to Hanko and from there at 1215 hrs, to Denmark.

OH-HVH (Agusta Bell 412)

An Agusta Bell 206 helicopter (OH-HRH) was on stand-by in Rovaniemi. In view of the mission, the crew decided to use the larger Agusta Bell 412 helicopter OH-HVH. A back-up crew was also taken on board the helicopter.

OH-HVH took off from Rovaniemi at 0510 hrs and arrived at the scene of the accident at 1015 hrs. The air operations co-ordinator first assigned it the inspection of liferafts, in addition to searching for possible survivors in the sea. OH-HVH was also informed about how to mark rafts that had been inspected. No rescue man was lowered during this flight, the rafts being inspected visually while the helicopter hovered over them. OH-HVH returned to Hanko at 1245 hrs.

At 1330 hrs, OH-HVH took off on a new mission, to look for oil spill which would indicate the location of the wreck. A streak of oil about 0.5 nautical miles long was found at the site. OH-HVH was soon requested to fly over to a Russian cargo vessel, where it was believed a person had fallen overboard. However, it soon became apparent that three bodies from the ESTONIA were in the water near the vessel. Since there were two other helicopters at the site, OH-HVH received permission to move further away. After recovering one body and inspecting two more liferafts, OH-HVH left to take the body to Utö. After this, it flew to Turku to change crews, landing there at 1600 hrs.

The second crew took off on its first flight at 1630 hrs. The air operations co-ordinator requested it to carry out search flights. Informed that a vessel had spotted three bodies in the sea, OH-HVH departed for the scene, where two bodies were brought up to the helicopter and taken to Utö. After this, OH-HVH took off for Nauvo for refuelling, landing there at 1920 hrs and taking off again at 1950 hrs. During the evening, OH-HVH further transported a first-aid team, and transferred one person injured in the accident from Hanko to a hospital in Turku. This last assignment lasted until 0055 hrs on the following morning.

The next two days were spent on searches and transport duties. On 30 September OH-HVH recovered one more body from the sea.

Y 61 (Boeing Kawasaki)

Y 61 took off from Berga at 1030 hrs and picked up two nurses from Huddinge Hospital. Arriving at the scene of the accident at 1140 hrs, Y 61 was assigned a search area north-east of the assumed location of the wreck. Nothing was found but empty lifejackets. Subsequently, Y 61 was ordered to search lifeboats and rafts. The canopies of the rafts were cut after search, and other crews were informed about the measures taken. No survivors or bodies were found.

Y 61 flew to Hanko in order to refuel and check the winch, which had been giving off a burning smell. After landing Y 61 was ordered to return to Berga. On the way it transported seven bodies to Turku. Y 61 landed at Berga at 1900 hrs.

Y 75 (Boeing Kawasaki)

Y 75 was assigned to transport a physician and a psychologist from Karolinska Sjukhuset, Stockholm, to the SILJA SYMPHONY. It departed from Berga at 1300 hrs. There were also two journalists on board during the flight. On the way, it was notified by a Russian merchant vessel that three bodies were in the sea near the vessel. Arriving at 1410 hrs, Y 75 observed the bodies. Two were completely submerged but one had its head above the surface. The latter was picked up. After this the physician and psychologist were taken to the SILJA SYMPHONY, to which they were lowered at 1500 hrs.

Y 75 returned to the Russian vessel and picked up one more body. The third had been picked up by Y 68 while Y 75 was en route to the SILJA SYMPHONY. Y 75 took the bodies to Utö and returned to Berga at 1705 hrs.

X 82 (Mi-8)

During the morning the personnel at the Utti helicopter base manned more helicopters for the rescue operation. X 82 took off at 1226 hrs. Three firemen/rescue men from the Helsinki Fire Department were taken on board at Utö. X 82 arrived at the scene of the accident at 1525 hrs and was requested to examine the liferafts that had drifted furthest away. No survivors or bodies were found during this flight.

O 98 (Super Puma)

O 98 took off from Söderhamn at 1155 hrs. On its way to the scene of the accident O 98 picked up one pilot and two rescue men from Uppsala. After refuelling in Hanko, O 98 took off for the scene of the accident at 1505 hrs, and returned to Hanko at 1840 hrs. No survivors or bodies were found during this flight.

Staying overnight at Turku, O 98 flew to Hanko on the following day and carried out one more search flight, between 0925 hrs and 1315 hrs, without finding survivors or bodies. O 98 departed for Söderhamn at 1400 hrs.

Y 72 (Boeing Kawasaki)

Y 72 carried out one search flight, taking off from Berga at 1500 hrs and returning there at 1940 hrs. The crew and two journalists were on board during the flight. Only empty liferafts and lifejackets were found in the search sector indicated by the OSC.

On the following day, the crew transferred to Y 69. Y 72 was manned by a new crew, and took off from Berga at 0919 hrs with a medical team from Huddinge Hospital. Y 72 flew to Turku, where the crew and team were briefed on the situation. Y 72 took off for the scene of the accident at 1307 hrs.

Y 72 began to search its assigned sector at 1350 hrs. After picking up three bodies, the crew observed that bodies and flotsam were drifting in quite a narrow area. Two more bodies were picked up from the sea. At 1640 hrs the helicopter departed for Utö to leave the bodies. The crew arranged with the coast guard vessel TURSAS, which was conducting the operations, that Y 69 would take over Y 72's search sector. Y 72 departed at 1950 hrs.

Y 76 (Boeing Kawasaki)

Y 76 flew from its base in Säve, via Berga

from where it took off at 1600 hrs for the scene of the accident. Two journalists were on board. Y 76 was assigned a search area south of the main accident area. It returned to Berga at 2025 hrs. During the flight, no survivors or bodies were found.

ES-XAC (Mi-2) and ES-XAB (Mi-2)

On the day of the accident, ES-XAC, a Mi-2 helicopter belonging to the Estonian AeroCo company, conducted a search flight along the northern coast of Estonia. The flights were continued during the following days with another helicopter, ES-XAB, belonging to the same company.

RA 22511 (Mi-8)

A Russian civilian Mi-8 helicopter, RA 22511, arrived in the accident area in the late afternoon of the day of the accident. Later in the evening it landed at Turku.

RA 22511 was equipped for maritime SAR but the crew did not have proper rescue clothing. On the following afternoon, RA 22511 was assigned a search mission, after which it returned to the base.

7.5.6 Action taken by fixed-wing aircraft

OH-PRB (Piper Navajo)

The crew of the Finnish Border Guard Navajo OH-PRB at Turku was alerted at 0445 hrs. The aircraft took off at 0547 hrs and arrived at the scene of the accident at 0613 hrs. It flew above the helicopters, searched for liferafts and informed helicopters and vessels of the location of these. Since radio communications did not function properly, OH-PRB served as a relay station between the vessels, MRCC and the helicopters. It returned to Turku at 1025 hrs. After changing crews it took off for the scene of the accident at 1115 hrs with the same tasks as before. It returned to Turku at 1535 hrs. A third flight was carried out between 1620 hrs and 2045 hrs.

On the following morning OH-PRB took off at 0610 hrs. On arrival the crew requested a situation report so that the helicopters could be briefed on the basis of this information. The aircraft carried out three search flights during the day.

OH-PRB's search flights were continued until 4 October.

SE-KVG (Casa)

On the night of the accident, the Swedish Coast Guard Casa 212 aircraft SE-KVG was in Turku, where, during the preceding night, it had participated in a joint Finnish–Swedish oil spill exercise in the vicinity. When informed of the accident, the Swedish Coast Guard's operations centre alerted its units in Finland.

On being alerted the crew of SE-KVG departed immediately for Turku from their hotel in Parainen.

SE-KVG was ready to depart at 0615 hrs. It was assigned tasks as a search aircraft and as a radio relay station. On the day of the accident it flew two search flights in the area of the accident, from 0630 hrs to 0930 hrs, and from 1125 hrs to 1445 hrs. Following instructions from the OSC, it searched for liferafts and lifeboats as well as survivors in lifejackets, reporting to the OSC.

Another Swedish Coast Guard Casa 212 aircraft, SE-IVF, was flown from its base in Sturup to Gotland in case it was needed. However, the aircraft was not assigned any task.

ES-PLW (L-410) and OH-AYH (AA-5)

On the day of the accident and for several days thereafter, ES-PLW, an L-410 aircraft belonging to the Estonian Government, conducted search flights along the Estonian coast. Beginning on 29 September OH-AYH, an AA-5 aircraft leased by AeroCo, also took part in these flights.

Table 7.8 Survivors taken to hospitals.

Hospital	Number
Helsinki University Central Hospital (HYKS)	20
Surgical Hospital, Helsinki	1
Maria Hospital, Helsinki	16
Western Uusimaa Regional Hospital, Tammisaari	4
Hanko Health Care Centre	8
Parainen Health Care Centre	4
Turku University Central Hospital (TYKS)	38
Mariehamn Central Hospital	8
Huddinge Hospital, Stockholm	8
Södersjukhuset (SÖS), Stockholm	31
Total number rescued	138[1]
Survivors	**137**

[1] One died in Huddinge Hospital.

7.5.7 Transport of rescued persons to safety

The first helicopter to reach the scene of the accident was instructed to transfer the survivors it had rescued to the nearest passenger ferries, and at 0222 hrs MRCC Turku ordered the vessels to ready their helicopter pads. However, only two helicopters, the Super Puma OH-HVG and the Agusta Bell 412 OH-HVD, were capable of landing on the pads.

The Utö coastal fortress island, the closest island to the scene of the accident, became the most important assembly point for the rescued survivors. The helicopters brought a total of 24 survivors to the fortress for transfer to hospital care.

A summary of the distribution of the survivors in various hospitals is shown in Table 7.8.

7.6 The human outcome

7.6.1 Data about victims and survivors

Based on the latest passenger and crew lists on 4 January 1996 it is believed that there were 989 people from 17 countries on board. Tables 7.9–7.13 give statistical information on the passengers, crew, survivors, identified bodies and missing persons.

Only 26 (5 %) of the women on board, as opposed to 111 (22 %) of the

Table 7.9 Survivors, identified bodies and missing persons.

	Passengers			Crew			All aboard		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Survivors	80	14	94	31	12	43	111	26	137 [1]
Identified bodies	35	23	58	18	19	37	53	42	95 [2]
Missing persons	303	348	651	37	69	106	340	417	757 [3]
Total	418	385	**803**	86	100	**186**	504	485	**989**

[1] 138 rescued, one died later
[2] 92 within the first few days, two found later, one rescued died
[3] 759 within the first few days, two found later

Table 7.10 Nationalities of passengers and crew.

Country	Total	Rescued	Missing	Identified bodies
Belarus	1		1	
Canada	1		1	
Denmark	6	1	5	
Estonia	347	63[1]	237	47
Finland	13	3	9	1
France	1		1	
Germany	8	3	4	1
Latvia	23	6	13	4
Lithuania	4	1	3	
Morocco	2		2	
Netherlands	2	1	1	
Nigeria	1		1	
Norway	9	3	6	
Russia	15	4	10	1
Sweden	552	51	461	40[2]
Ukraine	2	1	1	
United Kingdom	2	1	1	
Total	**989**	**138**[1]	**757**	**94**
%	**100**	**14**	**77**	**9**

[1] One of the rescued died later in hospital.
[2] The body of one missing person was found on 17.10.1994 and that of another on 11.5.1996.

Table 7.11 Ages of passengers and crew members.

Age	Male	%	Female	%	Total	%
<15	9	2	6	1	15	2
15–19	20	4	20	4	40	4
20–24	60	12	40	8	100	10
25–34	85	17	77	16	162	16
35–44	98	19	85	18	183	18
45–54	82	16	106	22	188	19
55–64	61	12	73	15	134	14
65–74	76	15	69	14	145	15
>75	13	3	9	2	22	2
Total	**504**	**100**	**485**	**100**	**989**	**100**

males were rescued. The majority of the rescued were aged between 15 and 44 years. Only 3 % of the males, but none of the females, over 65 years old were rescued.

7.6.2 Autopsy observations

The Estonian police requested executive assistance from the Finnish police to examine the causes of death of the victims as well as to identify them. After the Swedish authorities had accepted this procedure, the identification process was officially started.

Autopsies were performed on all victims found within the first days of the accident. All autopsies, except one which was performed in Stockholm, were performed at the Department of Forensic Medicine, University of Helsinki, which had the best resources in Finland for this.

In all the cases of drowning, hypothermia was regarded as a factor contributing to death. Of the victims, 25 were naked or almost naked, 18 had very insufficient clothing and 40 insufficient clothing for the weather conditions at the time of accident. Only 10 victims had extra clothing.

Fractures and/or injuries to inner organs were found in 28 cases and all victims had suffered minor or more extensive superficial excoriations, bruises etc.

Alcohol and/or medicaments did not play any significant role. Only three persons had more than 0.5 promille alcohol in blood. Classical narcotics were not found.

Table 7.12 Distribution of survivors by age group and percentage of survivors in each group.

Age	Male	%	Female	%	Total	%
< 15	1	11	0		1	7
15–19	7	35	2	10	9	23
20–24	26	43	4	10	30	30
25–34	25	29	10	13	35	22
35–44	30	31	6	7	36	20
45–54	16	20	3	3	19	10
55–64	4	7	1	1	5	4
65–74	2	3	0		2	1
> 75	0		0		0	
Total	**111**	**22**	**26**	**5**	**137**	**14**

Table 7.13 Cause of death.

Underlying cause	Male	Female	Total
Drowning	**35**	**34**	**69**
Contributing factor:			
Hypothermia	35	34	69
Injuries	6	8	14
Heart disease	2	–	2
Hypothermia	**16**	**6**	**22**
Contributing factor:			
Heart disease	2	–	2
Injuries	**1**	**1**	**2**
Contributing factor:			
Hypothermia	1	–	1
Total	**52**	**41**	**93**

Note: Two female bodies found later not included.

CHAPTER 8

OBSERVATIONS AFTER THE ACCIDENT

8.1 Locating the wreck

The locating of the wreck of the ESTONIA started on 29 September 1994, the day after the accident. The work was performed by the hydrographic survey vessel SUUNTA operated by the Finnish Maritime Administration. A side-scan sonar and a multibeam echo sounding system were used in the search.

The work was hampered by heavy weather. The wreck was spotted on 30 September, the location was confirmed and the position was marked with a buoy.

The wreck is located at 59°22,9' N 21°41,0' E. It is lying on the sea bed with a list of about 120° to starboard and with the bow towards the east. The vessel is resting in a stratum of soft clay at a water depth of 85 m at the bow and 74 m at the stern. The thickness of the clay stratum varies from 5 m, approximately amidships, to about 15 m at the stern and 25 m at the bow. Below the soft clay the sea bottom consists of stiff boulder clay. The vessel is probably in contact with the boulder clay amidships. The highest point of the wreck is at the stern, at a depth of 58 m.

The side-scan sonograms also indicate that there was debris from the wreck in an area 100 to 350 m west of the wreck.

8.2 ROV inspections

At its first meeting on 29 September 1994 the Commission decided that the wreck should be examined with a submarine Remotely Operated Vehicle (ROV) to ascertain her general condition and whether the bow visor had become detached. This work was performed by the Archipelago Sea Coast Guard Section of the Finnish Frontier Guard. The oil pollution control vessel HALLI of the Ministry for the Environment of Finland served as the operational vessel.

Videotapes were made on 2 October after some delay due to heavy weather.

The Commission decided at its meeting in Turku on 3–4 October that additional detailed ROV videotapes should be made for a more detailed view of the damage in the visor and ramp area. These tapes were made from the Finnish Coast Guard vessel TURSAS on 9–10 October.

8.3 Recovery of the visor

The Commission decided at its meeting in Turku on 3–4 October that a search was to be made for the bow visor. This was done by the TURSAS, equipped with a side-scan sonar and a low-frequency echosounder. The Estonian Coast Guard vessel EVA-200, equipped with a side-scan sonar, took part in the search.

The visor was found at 59°23,0' N 21°39,2' E about one nautical mile west of the wreck, on 18 October. That it was the visor was confirmed by ROV video-recordings.

The Commission decided that the bow visor should be recovered and brought ashore for a detailed survey. The recovery was carried out on 12–19 November. The Swedish Navy mine-sweeper FURUSUND and the Finnish Maritime Administration multipurpose ice-breaker NORDICA participated in the work.

The bow visor was recovered on 18 November. It was taken ashore in Hanko, Finland.

8.4 Diving investigation

The Swedish Government ordered a diving survey of the wreck to establish the condition of the interior of the vessel and the feasibility of lifting the entire wreck or recovering individual victims. A commercial deep-sea diving contractor was commissioned by the Swedish Maritime Administration for this purpose. The diving contractor was also commissioned to perform – for the Commission – a survey of the navigation bridge and the vessel's bow area. The diving survey was supplemented by ROV inspection of certain

areas. The survey was carried out on 2–5 December 1994.

The divers' observations and the ROV surveys were recorded on videotapes and in written reports. Certain parts from the visor attachment devices were recovered from the wreck for investigation. The detailed findings in the various areas are described in the following sections.

The following parts were removed and brought to the surface:

- One deck hinge bushing housing, most probably the inner starboard one.
- All three attachment lugs for the bottom locking device.
- The locking bolt for the bottom lock.
- One failed hinge lug from the port side inner ramp hinge.
- Two steel spacer rings from the failed ramp hinge.
- One EPIRB stowage case.
- One GPS receiver.
- One portable lifeboat radio set.
- One ship's bell.

8.5 Damage to the wreck

Damage to the visor and ramp attachment devices is covered briefly here for completeness of the description and is covered in further detail in 8.6.

8.5.1 General condition of the wreck

No external damage other than that in the visor and forward ramp area was observed on the wreck. Window panels were, however, pushed out in several places on the accommodation decks and doors in the aft bulkhead on decks 5 and 7 were missing. A door in the front bulkhead on deck 5 was open.

8.5.2 External hull damage

Diving and ROV inspections of the bow area of the wreck revealed certain damage to the installations in the bow area which are summarised in Figure 8.1.

Figure 8.1 Summary of damage in the bow area with reference to other figures.

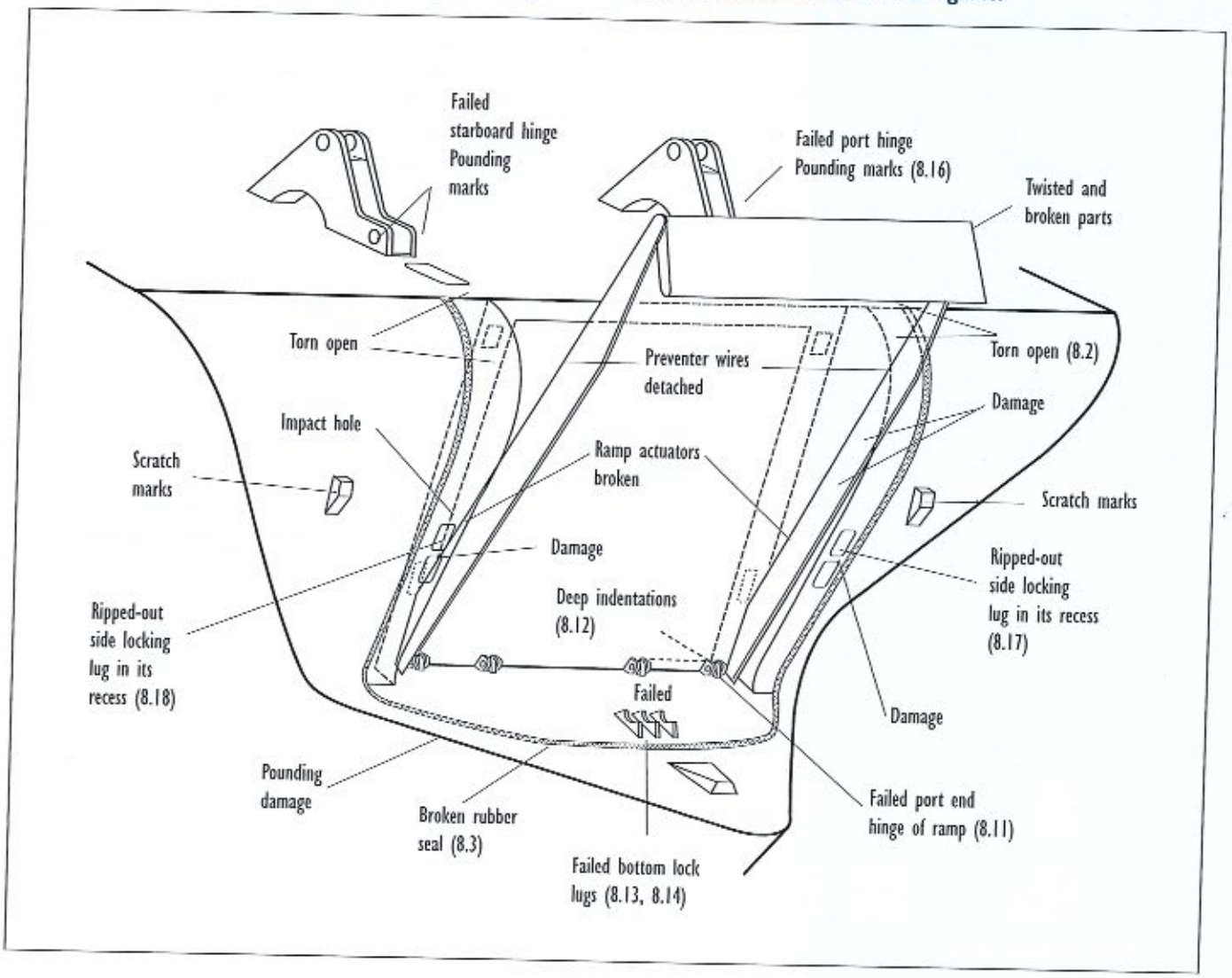


Figure 8.2 Damaged deck and front bulkhead in front of the opening for the visor operating actuator on the port side.

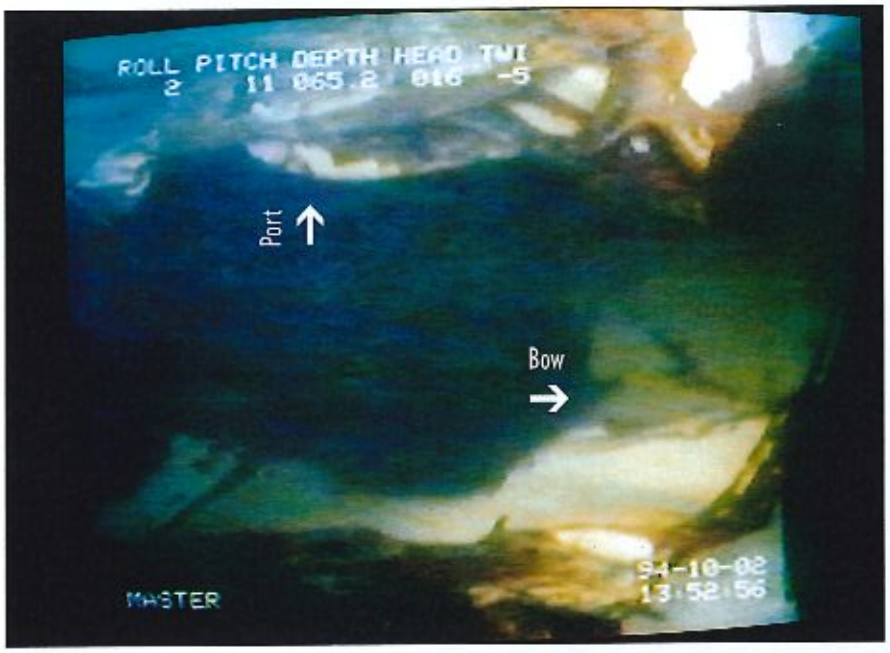


Figure 8.3 Broken visor rubber seal on the starboard side of the forepeak deck.

The deck hinge fittings on deck were undamaged except for pounding marks on their forward faces. The visor parking support was undamaged.

The deck was torn open from the visor operating actuator openings and forward. The openings continued for some length down the front bulkhead. The deck damage was extensive with uneven fracture surfaces whereas the opening in the front bulkhead on the port side had rather clean-cut contours (Figure 8.2).

The side locking lugs remained in their recesses, engaged on the locking bolts.

The bottom lock bolt housing was torn away as well as the support bushing.

The mounting bracket for the locking bolt position sensors appeared to be undamaged. The sensors were not on the mounting bracket but the magnet was still attached to the bracket on the locking bolt.

Various damage to the front bulkhead was found and in particular to its lower part.

There was various damage to the rubber seals and their supporting flat bars on the front bulkhead and, extensively, on the forepeak deck (Figure 8.3).

Pounding damage was recorded to the shell plating edges around the forepeak deck and to the ice-breaking stem on the bulbous bow. Various scratch marks were noted on the bulbous bow.

8.5.3 Visor damage

Figure 8.4 shows a summary of visor damage.

The visor shell plating had an extensive indentation on its front side, slightly starboard of the centre line (Figure 8.5). This indentation was a continuation of a sharp indentation and heavy scratch marks along the stem from its bottom. The heavy indentation continued with scratch marks along part of the starboard side of the visor. The damage contained extensive colour marks from the blue bottom paint of the vessel.

The solid stem post was folded inwards and was cracked in several places. The stem post had separated from the shell plating by cracking of the welds.

The bottom of the visor was heavily pounded and distorted (Figure 8.6). It was compressed upwards, varying up to about 0.5 m compared to the original shape.

Figure 8.4 Summary of visor damage with references to other figures.

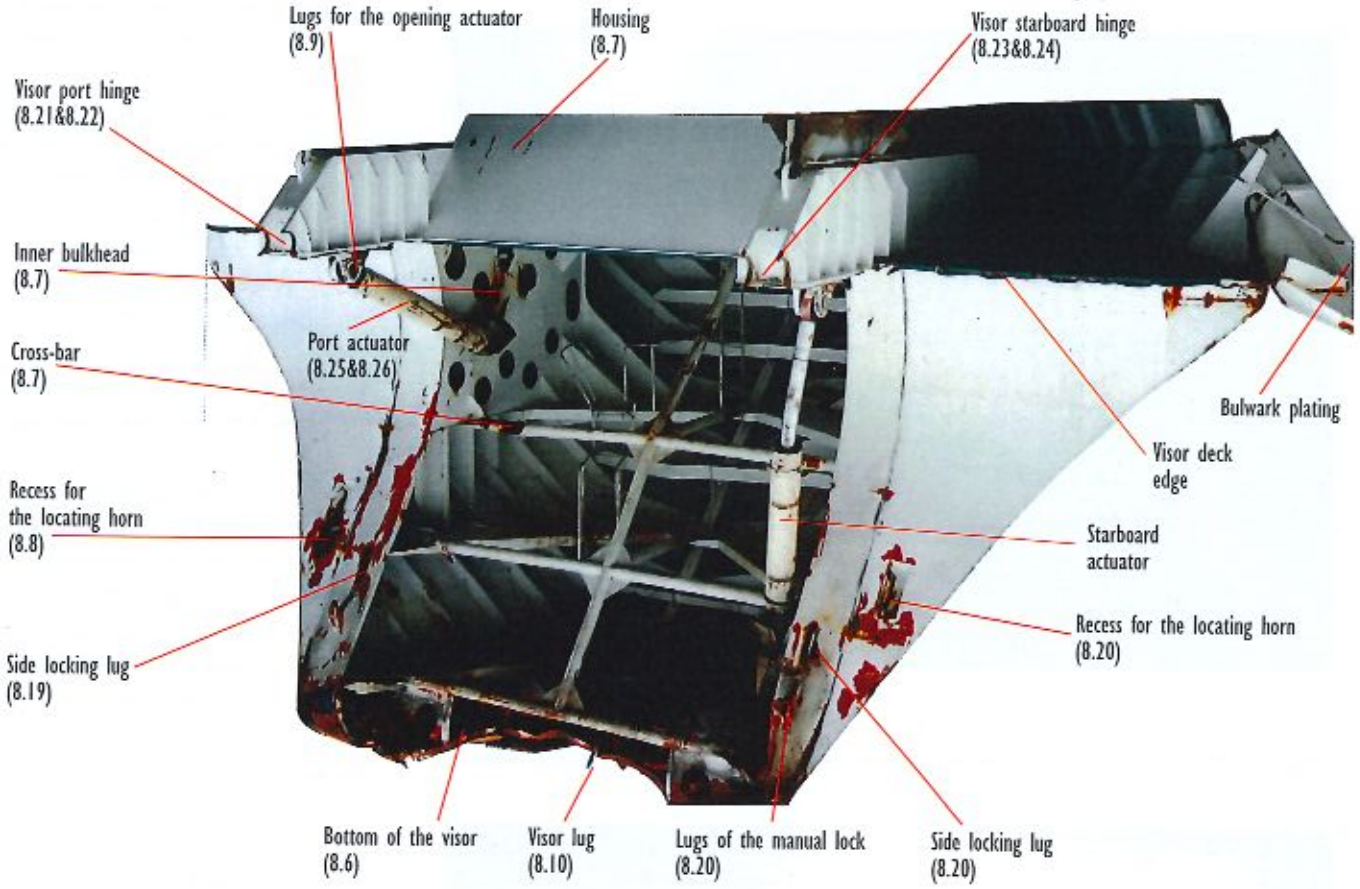


Figure 8.5Visor damage on the front side.

Figure 8.6 Damage to the bottom structure of the visor.

Figure 8.7 Impact marks in the port inner bulkhead, the uppermost cross-bar and the housing on the visor deck.

Figure 8.8 Damage to the recess for the port locating horn.

Figure 8.9 Score marks on the starboard side of the port actuator attachment lugs.

Figure 8.10 The visor lug for the bottom lock.

Figure 8.11 The failed port end hinge of the ramp surrounded by rags.

Figure 8.12 Indentations on a beam on the lower side of the ramp.

The inner vertical bulkheads of the visor had indentations and score marks on the port side (Figure 8.7).

The uppermost cross-bar in the visor had heavy impact marks (Figure 8.7). Other cross-bars had lighter marks.

The aft bulkhead of the visor had various damage. In particular the recess for the port side locating horn had been torn completely open in the area below the recess (Figure 8.8). Various impact marks from heavy contact between the visor and the hull were noted with some visor displacement to starboard and upwards.

Both side locking lugs had been torn out of the visor bulkhead, leaving rectangular holes in the plating.

The hinge bushings at the ends of the hinge beams had separated from the beam side plates.

The bottom plates of the hinge beams had pounding and impact marks around the attachment lugs for the visor opening actuators. The lugs for the opening cylinders had score marks on their starboard sides (Figure 8.9).

The bottom lock mating lug was stretched and pushed to starboard and the attachment structure cracked at the port side (Figure 8.10).

The housing on the visor deck had impact damage to the port part of its aft inner wall, including bent and dented bulb bars (Figure 8.7).

The aft edges of the hinge beams and the deck plating of the visor had heavy pounding marks.

The aftmost part of the bulwark plating of the visor on the starboard side and above deck 4 was folded outwards.

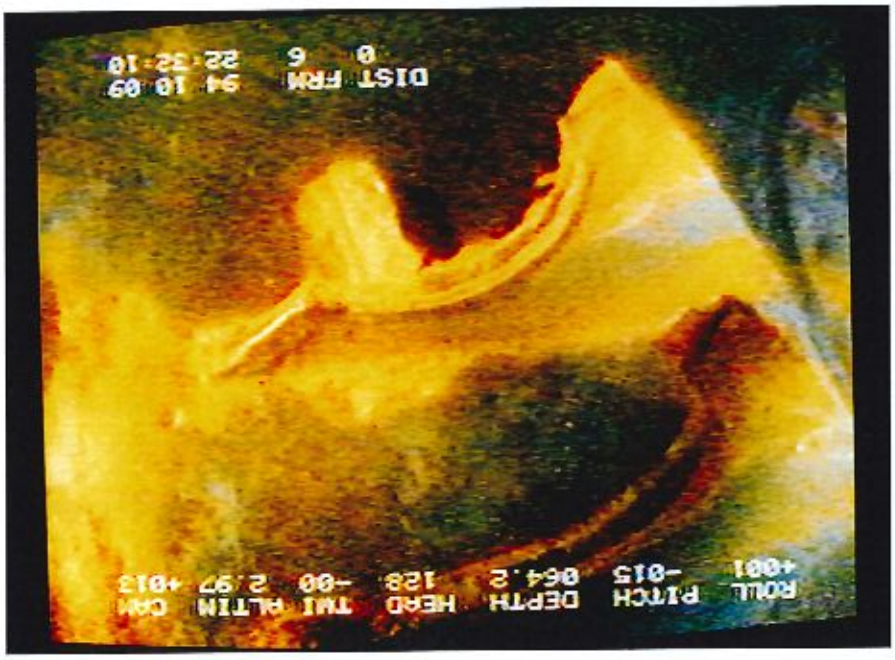
The visor lifting actuators had been pulled out of the hull structure, remaining connected to the visor hinge arms.

8.5.4 Ramp damage

The bow loading ramp was found slightly open, with a gap of about one metre at the top. The condition of the ramp was inspected primarily from its lower side

Figure 8.13 Failed bottom lock installation.

Figure 8.14 Failed starboard and middle lugs for the bottom lock installation.



due to the limited access to the upper side.

The two port side hinges at the bottom of the ramp were torn apart (Figure 8.11). Both hydraulic actuators for the ramp had failed in their piston rod end eyes, i.e. at the ramp attachment points. The actuators were in partly extended position as when the ramp is partly open. The wires preventing the ramp from falling down to the forepeak deck had detached from the lugs on both sides of the ramp.

Various deep indentations were found on the beams on the lower side of the ramp, in particular towards the bottom end (Figure 8.12).

The ramp port side beam was damaged in several places, mostly towards the top end.

The lugs for the pull-in locking hooks were twisted. The hooks themselves could not be inspected closely.

The boxes on the ramp side bars, mating the bolts of the ramp side cleats, were twisted to open position, except for the lower port side one. The side lock bolts were fully extended except for the lower port side one which was only partly extended.

8.6 Damage to the visor and ramp attachment devices

8.6.1 The visor bottom lock

All three attachment lugs for the bottom lock installation had failed (Figures 8.13 and 8.14). The locking bolt (Figure 8.15) remained attached to the actuating cylinder piston rod, which was bent (Figure 8.13). The remains of the attachment lugs and the locking bolt were removed from the wreck during the diving operation for close investigation.

It was noted that the weld beads between the lugs and the bolt housing and the support bushing respectively had failed partly in the bead itself and partly in the fusion zones. The steel plate of the lugs had failed in their thinnest sections, generally in a forward-upward direction. The two lugs for the bolt housing were twisted towards the port side.

When the locking bolt was removed from the actuator piston rod, the actuator was in fully extended, i.e. locked, position. The piston rod was bent upwards, away from the forepeak deck. The hydraulic hoses were connected. The bolt was checked for wear and deformation. The bolt was straight. The general diam-

Figure 8.15 Locking bolt for the bottom lock installation.

Figure 8.16 Deck hinge fitting, port side. One separated hinge bushing visible at bottom picture.

eter of the bolt was about 78 mm. Only a slight variation in diameter was measured at the contact area between the bolt and the visor lug. No other damage to the bolt was noted.

The mating lug in the visor was attached to the structure but was bent about ten degrees to starboard and the adjacent structure was deformed and cracked (Figure 8.10). The hole in the lug for the locking bolt had an original diameter of 85 mm while after the accident the hole was oval with dimensions at mid-thickness about 83 x 95 mm. The visor lug was removed from the visor after it had been brought ashore.

The recovered parts have been investigated with regard to properties of the material and characteristics of the fracture surfaces and deformations.

8.6.2 The visor side locks

The visor side locking lugs remained in their recesses in the front bulkhead of the ship, located on their locking bolts. The port side lug had rotated as far as it could in the recess in a direction indicating an initial upward movement of the attachment. The bottom face of the starboard lug was pointing out from the recess (Figure 8.18) indicating only a slight rotation in the same direction as the port lug. The divers estimated the play between the bolts and the holes in the lugs to be about ten millimetres. A hole due to an impact by the lugs of the starboard manual lock was noted in the front bulkhead just above the starboard side lock.

The lugs had separated from the visor by shearing of the visor plating around the attachment welds, leaving rectangular holes in the visor bulkhead plating (Figures 8.19 and 8.20). The tear pattern and deformation of the bulkhead generally indicated that the lugs had been torn off in a downwards and aft direction.

The length of the bottom face of the lugs was estimated from the length of the holes remaining in the visor to about 380 mm. The thickness of the lugs was confirmed to be 60 mm. The plating of the visor aft bulkhead was confirmed to be 8 mm.

8.6.3 The visor hinge arrangement

The visor deck hinge fittings were found during the ROV and diver surveys to be intact except for pounding marks on the side plates, essentially at their upper parts, above the centre of the hinges (Figure 8.16). The hinge shafts had almost fully

Figure 8.17 Bottom face of the port side locking lug.

Figure 8.18 Bottom face of the starboard side locking lug.

Figure 8.19 Damage due to separation of the port side locking lug, and the lugs of the manual lock.

Figure 8.20 Damage on the visor aft bulkhead on the starboard side near the separated side locking lug.

fallen out from the housings and the shaft starboard ends were resting on the deck railing. The starboard side bushing of the port hinge was still attached to the shaft as Figure 8.20 shows.

All four hinge bushing housings had separated from the side plates of the hinge arms. The failure had generally taken place at the fillet welds and the rim of the lug, surrounding the aftward facing part of the housing. The welds had failed generally in the fusion zones between either the weld beads and the housing or the bead and the side plates. Figures 8.21, 8.22, 8.23 and 8.24 show port and starboard failed hinge beam lugs.

One bushing housing, most probably the inner starboard one, was recovered by the divers and has been investigated in detail. The hinge beam side plates were likewise removed from the visor and have been investigated in detail.

8.6.4 The visor actuating arrangement

The failure of the visor actuating mechanism was caused by failure of the bottom mounting platform of the port side actuator and full extension of the starboard side actuator, whereupon the mounting platform was pulled out of the hull.

The port side actuator was found closed but showed signs of having been extended by about 0.4 m, indicated by scratch marks on the piston rod (Figure 8.25), which remained straight. The bottom mounting platform consisted of a reinforced section of deck 3, surrounded by vertical longitudinal and transverse structural members. Two bulb bars were arranged below the platform as part of deck 3 structure. One of these bulb bars showed repair of a previous crack, close to its end attachment to the vertical bulkhead. The platform was pulled out of the hull by shearing of the plating and failure of welds around the entire platform, sized about 600 x 450 mm (Figure 8.26). The bulb bars separated from the adjacent bulkheads because of weld failure. The old repair weld had not failed. The shear surfaces show indications of old cracks along a considerable part of their length.

The starboard side actuator initially failed because of failure of the hydraulic

Figure 8.21 Failed visor port hinge lugs.

Figure 8.22 Failed port lug of visor port hinge.

Figure 8.23 Failed port lug of visor starboard hinge.

Figure 8.24 Failed starboard lug of starboard hinge.

seals around the piston rod, allowing the rod to become fully extended. The piston rod was bent in the forward direction by about 30 degrees. The bottom platform of the mounting was eventually pulled out of the hull due to shearing of the platform and failure of the welds. A tongue of the forward bulkhead at the mounting platform was pulled out of the hull together with the platform.

The lugs for connecting the actuators to the visor deck beams showed indentations and scoring on the forward and starboard side faces (Figure 8.9). The sealing arrangement around the deck openings for the actuators, consisting of rubber seals supported by steel flat bars, was compressed over most of the surface and some paint marks showed that the hinge arms had been in limited contact with the deck plating.

8.6.5 The ramp attachment and locking devices

The two port side hinges at the bottom of the ramp had failed because of tension fracture of the ramp-mounted lugs.

The mounting of the pins for the upper locking hooks was heavily twisted. The locking hooks could not be inspected in detail but were confirmed to be in locked position. The hydraulic actuators were in extended (locked) position.

Three of the four side locking bolts were in their extended position and the mating boxes on the ramp side beams had been ripped open. The port side lower locking bolt was only partly extended and its mating box was undamaged.

8.6.6 The visor and ramp indicating devices

The magnetic-type position sensors for the bottom lock were not in position on their mounting bracket according to pictures taken during the ROV and diving investigations. The electric cabling that had been part of the sensor installation and the ends of the cables were visible in the area. The mounting bracket for the sensors appeared to be intact or possibly bent slightly aft. No other signs of any mechanical action could be seen on the

Figure 8.25 Scratch marks on the piston rod of the visor port side opening actuator.

Figure 8.26 The bottom end of the visor port side opening actuator.

bracket. The 12-millimetre-diameter bolt holes for the originally installed mechanical switches were empty. It is not fully clear how the magnetic sensors had been installed on the bracket.

The magnet which was part of the bottom lock position indicator was after the accident visible on its mounting bracket in the locking bolt. According to information obtained from the electrical engineer who installed the magnetic sensors and the magnet in the mid-1980s they were of the Siemens 3SE6-type.

The indicating sensors for the side locking lugs could not be inspected but the damage picture indicates that the locking devices were in fully closed position.

8.7 Condition of the interior

The interior of the vessel had suffered considerable damage caused by her turning over and by the rapid inflow of water during the sinking. Only part of the interior was, however, inspected during the diver investigation.

All loose equipment had slid down to the starboard side of the respective areas and collected there together with various debris. Ceiling panels and parts of the interior had likewise broken loose and collected along the starboard side. In the forward half of the accommodation decks the interior bulkheads and ceiling had been less damaged and many cabin doors remained closed.

The car deck was not surveyed due to the hazards related to divers working in the area. It is therefore not known whether the lashings had been able to restrain trucks.

8.8 Observations on the navigation bridge

The bridge, which was on deck 9, was entered by the divers mainly to collect instruments and other material for the accident investigation and to determine the status of instruments and controls. The inspection of the bridge was difficult due to poor visibility, the considerable vertical depth inside the bridge in the turned-over condition and the absence of items the divers could climb on. During this inspection the divers saw three bodies. One was near the door to the open deck and one in the chart room. The third body was seen on the starboard side bridge wing by a diver who tumbled down to the wing and accidentally came across the body.

A large amount of equipment had fallen down to the starboard side bridge wing, which was crushed against the seabed. The bridge wing could not be inspected due to mud and accumulation of debris, and for reasons of safety.

On the port bridge wing manoeuvre console the control lever for the port engine was found in full astern position and the lever for the starboard engine in 10 to 20 % forward position. The corresponding pitch indicators both indicated 100 % forward pitch. On the main manoeuvre console the port engine control lever was in about 50 % astern position and the starboard lever in 95 % astern position, both pitch indicators indicating between 50 and 55 % forward pitch. According to information from KAMEWA AB, the supplier, the pitch indicators should all irrespective of the actual pitch return to zero in case of electric power failure.

The navigation computer containing a data logging function with possible detailed information about the last part of the voyage could not be found. A GPS receiver was recovered, but no information could be retrieved from it. No other information could be retrieved from the navigation and operations equipment.

The radio station clock in the chart room showed 2335 UTC. Another bulkhead-mounted clock in the aft part of the bridge showed 0212 hrs.

The EPIRB beacon cages were traced on top of the bridge and one was recovered. They were both open and empty.

8.9 Victims

A total of 852 persons lost their lives in the accident. Of them one died in hospital and 92 were found in the water and in liferafts during the rescue operation and the following days. No victims were found on the seabed surrounding the wreck or on the external areas of the wreck during the diving survey. Two bodies have subsequently been found in the area of the Gulf of Finland, one in the open sea and one on the shorelines of Estonia. Still missing are 757 persons.

The survey of the interior was only partial and essentially limited to public areas and cabins along the port side of the wreck. About 130 victims, including those on the bridge, were observed in different areas. Many victims in various localities had lifejackets on. The parts of the ship inspected by the divers and the locations where victims were seen are shown in Figure 8.27.

On deck 8 the port aft cabins, the port aft passage and the aft part of the officers' mess were examined. No victims were seen, but most of the interior, including cabins and partitions had collapsed making visibility poor.

On deck 7 the cabins on the port side in the midship section were inspected through the windows. Visibility was limited due to floating debris but twelve victims were seen in four cabins. The main staircase, parts of the starboard corridor in the midship section and the aft staircase were inspected from inside. The starboard side of the main staircase was blocked by debris, making inspection impossible, but ropes were found hanging down, fastened on the outer deck 7. One victim was found in the main staircase. One starboard cabin was inspected and found empty. In the aft staircase, a lifeboat ladder was hanging down from deck 7 to deck 6.

On deck 6, the forwardmost port stairwell was inspected and contained many bodies. The entire starboard side of this staircase was full of debris. Six victims were found in the port side corridor in the forward section and in the transverse corridor. In seven cabins, inspected in this area, no victims were found. Two victims were found in the dance saloon near the stage and another nine in the Baltic Bar. Piles of debris made inspection of the starboard side impossible. In the main staircase no victims could be seen but much debris had piled up on the starboard side. The aft staircase and the adjacent lounge were inspected. In the lounge three victims were found and another five close to the staircase. Four cabins were inspected from the outside and revealed no victims.

On deck 5, the forwardmost port staircase was inspected through the windows and contained many victims also at this level. The corresponding staircase on the starboard side was also inspected and found empty. The adjacent cabins and corridors were also empty. All outside cabins in the port forward section were inspected through the windows. None of these appeared to contain any victims although visibility was poor due to floating debris. In the corridor outside these cabins, however, eight victims were seen. The divers also entered the shopping area amidships. Much merchandise had piled up or was floating and three victims were seen in the limited area that could be inspected. The staircase and adjacent hall aft were also inspected. Two victims were found but the collapse of the deck head linings made further inspection impossible. The cafeteria was inspected from the windows aft and from inside on the port side and two victims were seen.

On deck 4, divers inspected localities through all windows on the port side. Visibility was sometimes poor but three victims could be seen inside cabins and one in the night club. Two forward cabins in this area, one outside and one inside, contained two and three victims, respectively, and in the corridor were another three. In the main staircase the divers counted 35 victims but they stated that the actual number of victims in the area was much higher.

On deck 1 the divers entered ten cabins in the foremost part of the cabin department. No victims were found and the cabins seemed to have been unoccupied. Further aft two victims were seen in a corridor and in six inspected cabins in this area a total of four victims were seen in three of the cabins.

8.10 Life-saving equipment

After the accident, lifeboats, liferafts and lifejackets from the ESTONIA drifted towards the Estonian coast in an east-south-easterly direction and were recovered by vessels and by people on shore.

One lifeboat was observed on the wreck, still attached to its davits. The other nine lifeboats were detached and have been recovered from the sea. However, only two small pieces were found from one of them. The man-over-board boat (MOB) was found drifting outside Hanko on the Finnish coast.

Of the liferafts, 52 of the 63 have been found. Two of them were not inflated. One raft was found by a Russian helicopter, 21 were found on the Estonian coast and the rest were recovered by vessels in the area.

Ten rafts that belonged to vessels participating in the search and rescue operation were found as well as three launched by Swedish rescue helicopters. Also a Russian-manufactured raft, used for training on board the ESTONIA, was recovered.

It has not in general been possible to determine which rafts were used by survivors or victims of the accident.

Technical experts from the Finnish police have examined all recovered life-saving equipment and found some damage. In particular with reference to the liferafts, it should be recalled that part of the observed damage was most likely caused when the equipment was recovered by vessels or washed ashore.

Figure 8.27 Divers' sightings of victims.

Green colours indicates divers' movements and inspection of interior from outside through windows and from inside. Red circles and ovals show approximate locations where victims were sighted. White figures indicate numbers of victims at each location. White 'X's indicate unspecified numbers of victims, e.g. where doorways were blocked, preventing divers from entering.

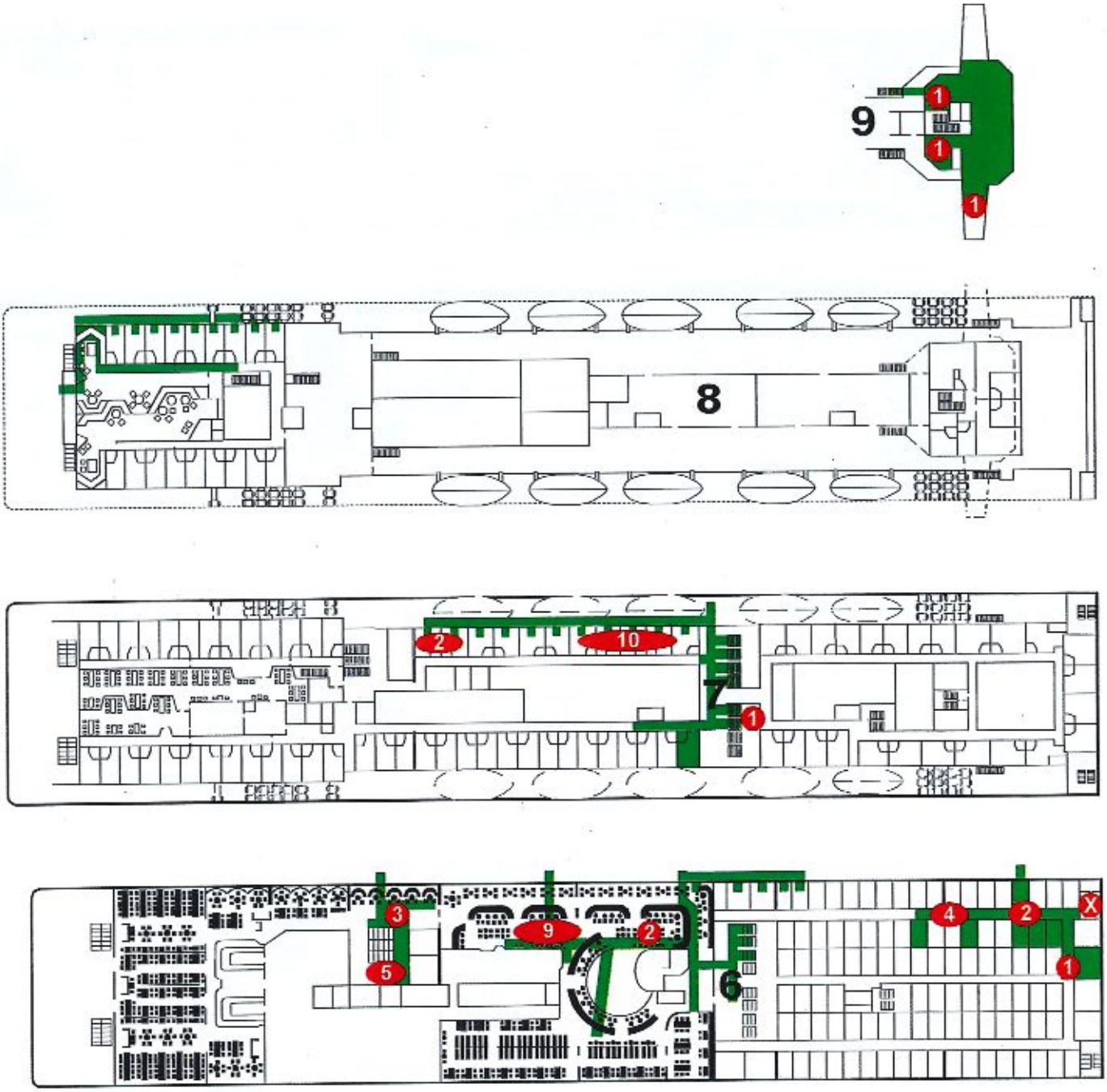
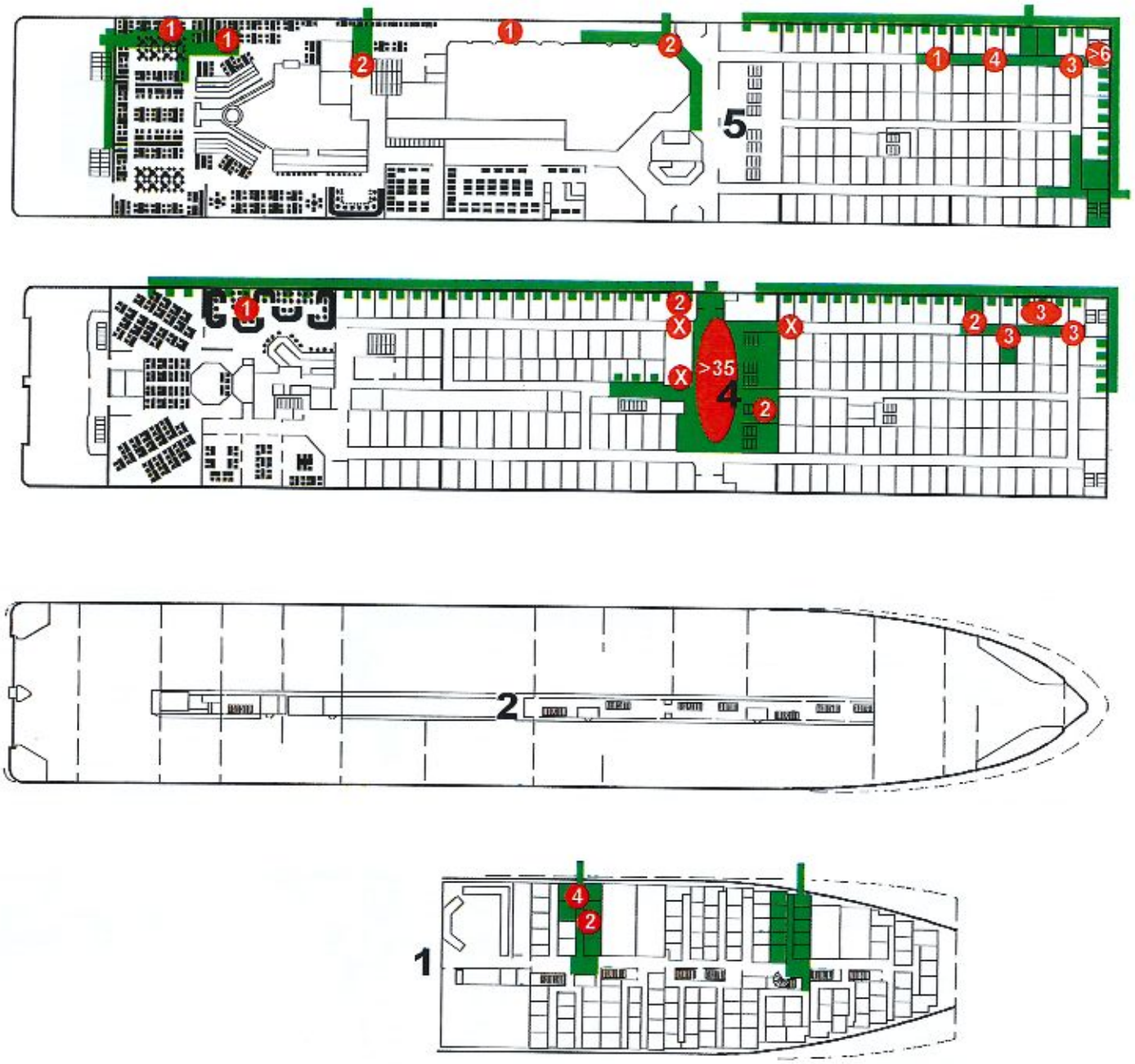


Figure 8.27 (continued)



8.11
The EPIRB beacons

The EPIRB beacons along with some liferafts and lifejackets were found on 2 October 1994 by two Estonian fishing vessels in the vicinity of Dirhami on the north coast of Estonia. The beacons were switched off when found.

On 28 December 1994 the condition of the above EPIRBs was tested by the Finnish experts. The radio beacons proved to be in full working order when switched on.

On 24 January 1995 both EPIRBs were activated on board the Estonian icebreaker TARMO, when they worked without interval for four hours. According to the Russian COSPAS Mission control centre, whose area of responsibility includes the Estonian waters, the radio beacons were transmitting the signal in the normal way throughout the test period.

8.12
Other observations

The propellers were observed to be in almost zero pitch position and the rudders in hard starboard position. The only watertight door on deck 1 which the divers were able to inspect was closed.

The eye bolts of the manual visor locks were in open position according to the ROV survey. The lugs of the manual lock on the starboard side of the visor were heavily twisted due to a blow to the front bulkhead of the vessel.

Certain discrepancies were noted between the structure of the visor as recovered and manufacturing drawings. These included:

Absence of two longitudinal flat bars and related transverse brackets on the visor bottom plating. No signs of such flat bars having been installed could be seen.

The lowest bow band to the stem plating was welded only from above (area affected by ice damage repair).

One bracket at the aft bulkhead on the port side and between stringers 2 and 3 had been replaced, with defects in the new welding.

One bracket located where the aft bulkhead meets the shell and deck platings on the port side was missing, and cutting marks indicated it had been removed.

Lower edge of bottom lock mating lug differed from drawing shape by flame cutting of its forward corner.

The deck part of the installed hinge arrangement differeded considerably from the manufacturing drawing.

It was learned after the accident that a student working temporarily in an onboard maintenance team observed, but failed to report, in August 1994, some cracks in the fillet welds between the hinge beam side plates and the hinge bushings. The cracks were located in the lower section of the weld beads between the hinge beam side plates and the hinge bushings on the side facing the deck part of the hinge installation. One crack, about 100 mm long, and one shorter crack were observed in the starboard hinge lugs. One crack, about 60 mm long, was observed in one lug at the port side hinge. The cracks were in an area not visible when the visor was closed.

The Finnish police have taken several paint samples from inside the visor. TLC (thin layer chromatography), LC (liquid chromatography) and spot tests analysis of these revealed no vestiges of explosives.