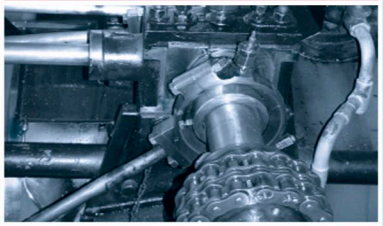
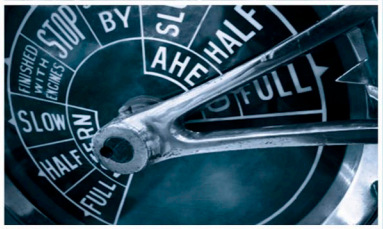
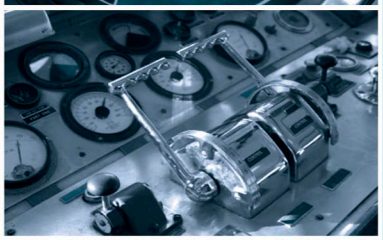
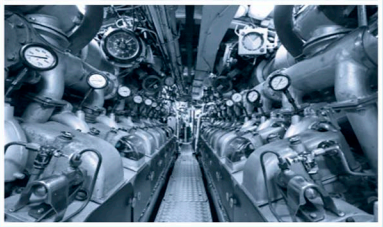
TECHNICAL REPORT A-15/2010

Investigation of the sinking of F/V ROSAMAR, 24 miles from Burela on the 5th of December, 2008



GOBIERNO DE ESPAÑA

MINISTERIO DE FOMENTO

SECRETARÍA GENERAL DE TRANSPORTES

COMISIÓN PERMANENTE DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES MARÍTIMOS

Technical report

A-15/2010

Investigation of the sinking of F/V ROSAMAR, 24 miles from Burela on the 5th of December, 2008

GOBIERNO DE ESPAÑA
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COMISIÓN PERMANENTE DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES MARÍTIMOS

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NOTICE

This report has been drafted by the Standing Commission for Maritime Accident and Incident Investigations, CIAIM, regulated by the 26th Additional Provision to Law 27/1992, dated 24 November, by National Ports' (Puertos del Estado) and the Merchant Navy (Marina Mercante), and by Royal Decree 862/2008, dated 23 May, whose functions are:

1. To carry out the investigations and technical reports of all serious and very serious maritime accidents in order to determine the technical causes that originated them and make recommendations for the purpose of implementing the necessary measures to prevent them from occurring in the future.

2. To carry out the technical investigation of maritime accidents when lessons learned can be obtained for maritime safety, to prevent marine pollution from vessels, and to produce technical reports and recommendations on the same.

In no case will the purpose of the investigation be to determine any fault or responsibility, and the drafting of the technical reports will in no way pre-judge the decision that may fall upon courts of law, nor will it seek the evaluation of responsibilities or determination of culpabilities.

In accordance with the aforementioned, the direction of the investigation listed in this report has been carried out without necessarily resorting to test procedures and without any fundamental purpose other than to determine the technical causes that may have caused the maritime accidents and incidents, in order to prevent these from occurring in the future.

Therefore, the use of the investigation results with any purpose other than the one described is subject in all cases to the aforestated premises and must not, therefore, prejudge the results obtained from any other report that, in relation to the accident or incident, may be initiated in accordance with current legislation.

The use made of this report for any purpose other than for the prevention of future accidents may lead to erroneous conclusions or interpretations.

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GLOSSARY OF ABBREVIATIONS, ACRONYMS, SYMBOLS AND TERMS

AEMET	*Agencia Estatal de Meteorología.* Public Meteorological Agency.
AETINAPE	*Asociación Española de Titulados Náutico-Pesqueros.* Association of Certified Fishing Vessel Operators.
Blue box	Electronic system that automatically transmits data (identification, course, geographic position, speed, etc.) of fishing vessels larger than 15 m in length, via satellite to a ground base station, which in turn sends this data to the Fishing Tracking Centre (FTC) of the Ministerio de Medio Ambiente y Medio Rural y Marino (Secretariat General of the Sea: Environment and Rural and Marine Affairs Ministry).
CEDEX	*Centro de Estudios y Experimentación de Obras Públicas.* Centre for Public Works Studies and Experimentation.
CEHIPAR	*Canal de Experiencias Hidrodinámicas de El Pardo.* Public Hydrodynamic Centre for Model Tests.
CIAIM	*Comisión Permanente de Investigación de Accidentes e Incidentes Marítimos.* Standing Commission for Maritime Accidents and Incident Investigations.
Cofferdam	Safety compartment that is normally empty for the purpose of separating two spaces of a vessel to prevent its contents from making contact in case of failure.
COIN	*Colegio Oficial de Ingenieros Navales y Oceánicos.* Professional association of Naval Architects and Ocean Engineers.
COMME	*Colegio de Oficiales de la Marina Mercante Española.* Professional Association of Merchant Navy Officers.
DGMM	*Dirección General de la Marina Mercante.* General Directorate for the Merchant Navy.
EEZ	Exclusive Economic Zone.
F/V	Fishing vessel.
GM	Metracentric height. Distance between the centre of gravity (G) of a vessel and the metacentre (M).
Hoist	Pull or hoist a line, cable or chain by mechanical or manual means.
IPTM	*Instituto Portuário e dos Transportes Marítimos Portuguese* organization responsible for investigating maritime accidents and incidents.
I	Geographic latitude.
L	Geographic longitude.
MAYDAY RELAY	Emergency signal transmitted by a coastal station or vessel other than the vessel that is in distress.
MMSI	Maritime Mobile Service Identification number.
Mooring line	Rope used for mooring the vessel.
MRCC	Maritime Rescue and Coordination Centre.
PAN PAN	Signal used to announce an urgency radio-telephonic procedure, by which an urgent message regarding the safety of a vessel or a person is going to be transmitted.
RCC	Maritime-radio Communications Centre.
Release	Let go or release a fishing gear or a line.
R/A	Rescue aircraft.
R/H	Rescue helicopter.
R/V	Rescue vessel.
SASEMAR	Spanish Maritime Safety and Rescue Agent.
Snag	When a fishing gear gets snagged on an obstacle located at the bottom and cannot be released.
Snatch block	Pulley block with an opening on one of the sides of the block for the working line to pass through.
SPMCC	*Spain Mission Control Centre.* Corpas-Sarsat Mission Control Centre in Spain and located in Maspalomas, Gran Canaria.
Trim	Difference between the forward and aft draughts of a ship.
Untie	Free, loosen or separate a line to set it free. Undo knots.
UTC	Universal Time Coordinated.

SYNOPSIS

The accident

At 07:45 UTC on the 5th of December, 2008, MRCC Madrid received a radio-beacon alert from SPM-CC Maspalomas, identified as belonging to fishing vessel ROSAMAR, which was operating under a Portuguese flag.

Once the rescue assets were mobilized and in the area, they were able to rescue 5 crewmembers alive, along with three other deceased, but they did not find any remains of the fishing vessel. The five remaining crewmembers were declared missing. Eleven days later, another vessel that was in the area recovered the body of one of the missing sailors.

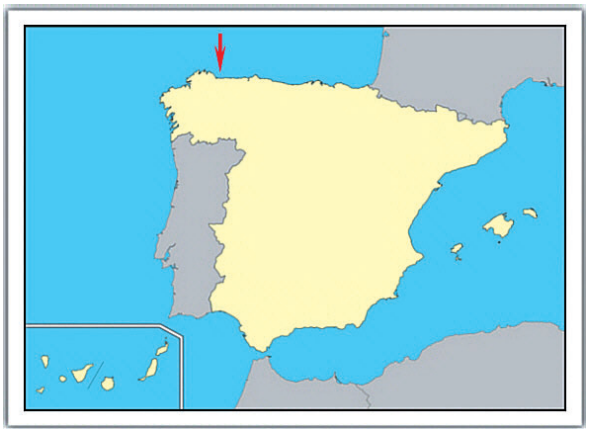


Figure 1. Area where the accident occurred

Main conclusions

The reasonings deduced from this report have enabled this Commission to conclude the following:

- The day of the accident, F/V ROSAMAR departed from the port of Burela with thirteen crewmembers on board, but one of them was not included on the vessel's crew list.
- At the time of the accident, the vessel had been dispatched from Figueira Da Foz, Portugal, with all her documentation in order.
- F/V ROSAMAR's fishing gear got snagged when she was operating at a depth of 250 m.
- The trawling machines continued hoisting after the gear got snagged due to one of the following reasons:
  - The trawling machines were operating in manual mode, without any of the crewmembers controlling them.
  - The trawling machine's constant tension control was turned on and suffered a malfunction.
- None of the crewmembers controlled the trawling machines from the deck or from the wheelhouse.
- The Skipper attempted to access the area where the trawling machines were located but was not able to because the sinking of the stern and the sea surge prevented him from doing so.
- The tension of the machine's cables was such that the vessel's stern sank, resulting in flooding of the fishing area. Three factors contributed to the flooding:
  - The doors used to access the fishing machines from the fishing area were left open, which was a normal practice in this vessel.
  - The sea surge and the waves coming in over the stern and the port area contributed to the flooding.
  - The hatch used for accessing the fish handling room from the upper deck opened hydraulically towards the inside; in other words, towards the main deck. This way, the hydrostatic pressure of the water that accumulated on the upper deck when the stern sank, caused the hatch to open and flooding of the fishing area.
- The minimum break load of the cables was high enough for these not to break during the accident.
- The engine room flooded because the door for the stairs that communicated the fishing area with the engine room was left open.

- The crew did not ask for help, nor did they report the emergency, which was known when the 406 MHz radio beacon automatically activated during the sinking.
- Due to the flooding, the vessel's stern progressively sank, while the effect of the waves caused her to heel towards her port side.
- The crew was able to launch the starboard life raft into the water.
- We are only certain that five of the thirteen crewmembers were wearing their life vests, and one of them lost the vest when he jumped into the water because he was not wearing it properly.
- R/H PESCA II was away from its home base at the airport of A Coruña, for the purpose of providing coverage for the Galician coast since R/H HELIMER GALICIA was down for periodic maintenance. For this reason, R/H PESCA II only had one crew available and at the time of the accident, the crew were resting at a hotel near the airport. This was the reason why the helicopter was delayed for one hour and nine minutes prior to taking off and heading towards the area of the accident.

* * *

Chapter 1. THE INVESTIGATING COMMISSION

1.1. Introduction

The investigation of the accident involving F/V ROSAMAR was carried out by the Standing Commission for Maritime Accidents and Incident Investigations (CIAIM), collegial body assigned to the Subsecretaría General de Transportes (General Under Secretariat for Transport) of the Ministerio de Fomento (Ministry of Public works and Transport), charged with carrying out the technical investigation of:

- Maritime accidents and incidents involving Spanish civilian vessels.
- Maritime accidents and incidents involving foreign civilian vessels when these occur within Spanish waters or Spanish territorial seas, and those occurring outside these when Spain has considerable interests at stake.

The CIAIM and the Investigation of Maritime Accident and Incidents is regulated by the twenty sixth Additional Provision to Law 27/1992, dated 24 November, by National Ports and the Merchant Navy, and by Royal Decree 862/2008, dated 23 May.

The investigation carried out by CIAIM was limited to establishing the technical causes that caused the accident as well as to making recommendations that make it possible to prevent accidents from occurring in the future.

1.2. Investigation

Initially, the Secretariat of the CIAIM understood that Portugal was going to lead the investigation of the accident since F/V ROSAMAR was navigating under a Portuguese flag, it had been dispatched in Portugal and the deceased and missing crewmembers were Portuguese and Indonesian. Therefore, the Secretariat notified the *Instituto Portuário e dos Transportes Marítimos* of Portugal (IPTM) that Spain was substantially interested in the investigation of the accident involving F/V ROSAMAR and offered its collaboration and assistance.

Afterwards, the IPTM and the CIAIM agreed that the investigation would be led by Spain and, therefore, the investigation tasks were carried out by CIAIM's Secretariat personnel.

It is worth mentioning that the majority of the documents used during the investigation are written in Portuguese and have been translated into Spanish by CIAIM's Secretariat personnel.

On the 21st of December 2010, the CIAIM's Plenary, which is made up of the members listed in Annex 1 of this report, unanimously approved its contents as well as the conclusions and recommendations included therein.

1.3. Compiling the information

In compiling the information, the CIAIM was assisted by the Maritime Authority of Burela, the General Directorate for the Merchant Navy (DGMM), the *Instituto Portuário e dos Transportes Marítimos* of Portugal (IPTM), the Maritime Rescue and Safety Society (SASEMAR) and the Portuguese Naval Command.

The documentation used in drafting this report was the following:

- "*Datalhes FV ROSAMAR*" sent on the 5th of December, 2008 by the MRCC of Lisbon.
- "*Memória descritiva transformação/mo-dernização*" of F/V ROSAMAR, drafted by Estaleiros São Jacinto, S.A. de Aveiro, Portugal, and approved on the 2nd of April, 2002.
- "Report regarding the dispatching of vessel ROSAMAR" issued on the 28th of January, 2009 by the Maritime Authority of Burela.
- Crew list sent on the 5th of December, 2008 by the company PESCARIAS LABAYEN Lda.
- Crew statements provided on the 6th of December, 2008 to the Maritime Authority of Burela.

- General Emergency Report 4976/08 issued by SASEMAR.
- "Accident scene initiated due to the sinking of vessel ROSAMAR, resulting in the death of three people", carried out by the Burela team from the Judicial Police Task Force from Lugo's Civil Guard unit on the 5th and 6th of December, 2008.
- Materials and supplies list corresponding to F/V ROSAMAR, collected by R/V IRMÁNS GARCÍA NODAL and delivered to the ship-owner.
- Materials and supplies list corresponding to F/V ROSAMAR, collected by R/V MARIA DE MAEZTU and delivered to the shipowner on the 7th of December, 2008.
- "Study regarding the maritime weather conditions during accidents involving vessels - Vessel: ROSAMAR" carried out by the CEDEX in January, 2009.
- Photographs taken of F/V PENINSULA, which is a sister ship of F/V ROSAMAR.
- Accident press releases.
- The Following vessel documentation:
  - *"Prova de estabilidade e navio leve"*, approved on the 18th of July, 2002.
  - "Tank drawings" approved on the 18th of July, 2002.
  - Hull design chart.
  - Outline plans.
  - Updated general layout plan.
  - Drawing of the transverse sections structure.

* * *

Chapter 2. FACTUAL INFORMATION

2.1. The vessel

F/V ROSAMAR was a coastline fishing vessel under a Portuguese flag, engaged in stern trawling operations. Her port of registry was Leixões, Portugal, and her base port was Burela, Spain.

The vessel was built by Estaleiros Navais Do Mondego S.A.R.L. in Figueira Da Foz, Portugal, and she entered service on the 1st of January, 1978.

In 2002, a modification was carried out at Estaleiros São Jacinto S.A. in Aveiro, Portugal. At that time, the ship-owner was the company MARQUES & FILHOS - SOCIEDADE DE PESCA Lda.

Her last owner was company PESCARIAS LABAYÉN Lda., registered in Portugal with Spanish owners.

Figure 2. F/V ROSAMAR

2.1.1. *Main Characteristics*

Her main characteristics were:

Table 1. Main Characteristics

Vessel Name	ROSAMAR
Builder	Estaleiros Navais Do Mondego S.A.R.L.
Year built	1978
Year modified	2002
Registration number	L-605-C
MMSI	263468000
Call sign	CUPC
Fishing method	Stern trawling
Hull material	Steel
Length overall	34,50 m
Length between perpendiculars	31,06 m
Breadth	7,60 m
Moulded Depth	2,68 m
Depth of the main deck	3,60 m
Average draught	3,00 m
Fuel capacity	90,00 m^3
Lubricating oil capacity	2,00 m^3
Fresh water capacity	12,00 m^3
Capacity of the cargo holds	145,00 m^3
GT	268,00
Lightweight displacement	309,44 t
Propulsion power	1160,00 Hp
Propulsion	Shrouded propeller

2.1.2. *Modifications carried out on the vessel in 2002*

As per the specifications drafted by the shipyard, several modifications and modernization steps were carried out on the vessel in 2002 for the purpose of:

- Improving the working conditions and the efficiency of the fishing system.
- Improving the handling, treatment and preservation of the fish on board.

The primary works carried out, which were in compliance with the requirements established by the Portuguese Vessel Inspection Authority, were the following:

- The existing wheelhouse was refurbished, the interior distribution was modified and electronic equipment consoles were installed as well as the engine controls.
- The wheelhouse entrance ladder was removed and its corresponding opening was closed.
- A new access to the wheelhouse was built, including the ladder and the door.
- New insulation, navigation lights, windshield wipers and supports for the antennas, radars and lights were installed.
- A new rack for the pneumatic life raft was installed.
- The gantry crane was refurbished, supported on the port side over the ventilation stack and on the starboard side over the exhaust stack.

Figure 3. Modification of the gantry crane

- A new net drum supplied by the ship-owner was installed.
- The following stainless steel items were installed in the fishing area:
  - A new conveyor belt for classifying and packaging.
  - Ducting for moving the fish.

Figure 4. Net drum

  - A 15 m^3 fish hold for receiving the fish.
- The stacks and the flooring were modified and a new service ladder was installed between the main deck and the upper deck.
- Two stainless steel drainage wells were installed on the main deck, in the fish handling room, one on each side. An AZCUE VRX 80/17, 3 kW at 1,450 rpm sump pump was installed in each well.

Figure 5. Sump pump

- The cargo hold was modified, replacing the dividers used for stowing the fish boxes.
- A new primary engine was installed.
- The main electrical panel was upgraded.
- Iron castings were added to the keel box to serve as fixed ballast.

2.1.3. *Dispatching and certificates*

F/V ROSAMAR was operating off the Spanish coast with a fishing license as per the fishing agreement between Spain and Portugal for the Exclusive Economic Zone (EEZ) of Spain in the Atlantic, along the Iberian Peninsula between 12 and 200 miles.

During 2008, F/V ROSAMAR was normally time dispatched for three months at a time from the port of Burela, according to dispatch Order dated 18 January, 2000, chapter III, art. 21, sections 1 and 2 since she returned to port each day to unload and sell the fish. The last dispatches that were carried out in Spain were:

Table 2. Dispatching of F/V ROSAMAR in Spain

Dispatch in	*Issue date*	*Expiration date*
Burela	25/02/2008	29/03/2008
Burela	11/04/2008	11/07/2008
Burela	01/08/2008	01/11/2008

The information required for the dispatching consisted of:

- Skipper's General Statement.
- Up-to-date crew list as of the date of the dispatch.
- Current Conformity Certificate.

The expiration date of the dispatch issued on the 25th of February, 2008 was the 29th of March, 2008 instead of the 25th of May, 2008 because on the 30th of March, 2008, the radio-electric Conformity Certificate expired. Once the aforementioned Conformity Certificate was renewed, the vessel was once again dispatched for three month at a time.

At the time of the accident, the vessel had been dispatched by Portuguese authorities in Figueira de Foz.

2.1.4. *General arrangement*

The vessel had three decks.

2.1.4.1. *Upper deck*

This deck included the following items and main compartments:

1. Access to the forward storeroom
2. Access to the nets storeroom.
3. Wheelhouse.
4. Stairs going down to the main deck.
5. Net drum.
6. Forward access to the fish processing area.
7. Fan room.
8. Aft access to the fish processing area.

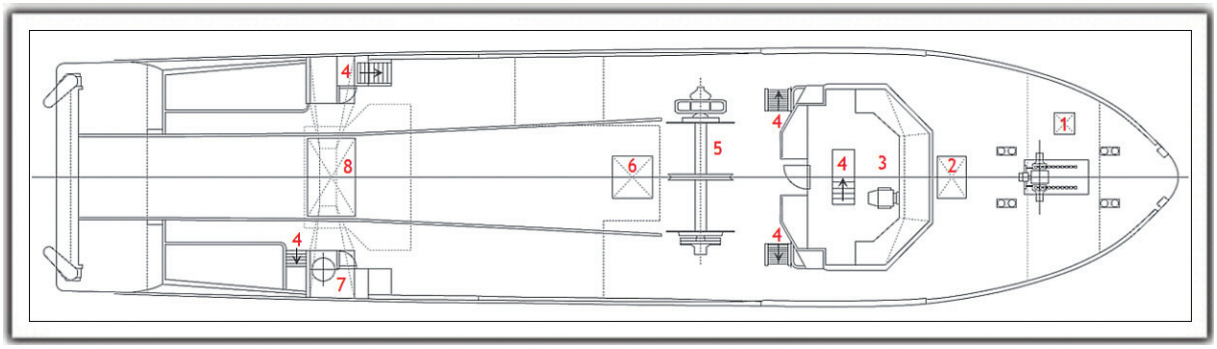


Figure 6. Upper deck

2.1.4.2. *Main deck*

The main items and spaces on this deck were:

1. Access to the forward storeroom from the upper deck.
2. Forward storeroom.
3. Chain lockers.
4. Berthing for four sailors.
5. Access going down to the nets storeroom.
6. Berthing for four sailors.
7. Skipper's head.
8. Ice machine.
9. Crew head.
10. Skipper's berthing.
11. Ladder going up to the wheelhouse.
12. Mess hall.
13. Berthing for 2 sailors.
14. Berthing for the First and Second Mechanics.
15. Crew head.
16. Berthing for the Boatswain and the Fishing Skipper.
17. Galley.
18. Room access doors from the fish processing area.
19. Access to the fish processing area from the upper deck.
20. Fish processing area.
21. Stairs going down to the engine room.
22. Table for selecting and packaging the fish.
23. Waste door.
24. Gutter with a belt for moving the fish.
25. Drainage wells.
26. Ladder going down to the engine room.
27. 15 m^3 fish hold for collecting the fish.
28. Emergency exit from the engine room.
29. Exhausts.
30. Access from the upper deck.
31. Ventilation.
32. Doors for accessing the fishing machines from the fish processing area.
33. Trawling machines.
34. Access to the engine room storeroom.
35. Steering gear locker.

2.1.4.3. *Lower deck*

This deck included the following items and main compartments:

1. Forepeak.

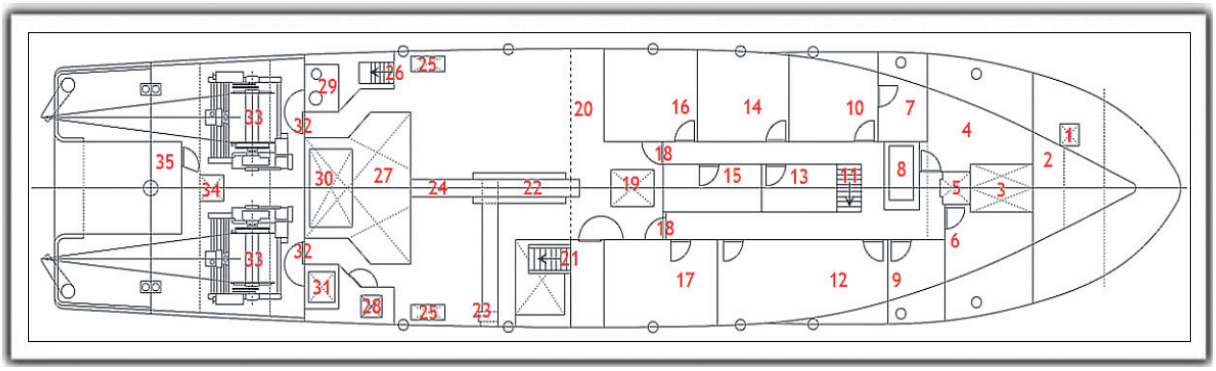


Figure 7. Main deck

2. Moorings storeroom.
3. Nets storeroom.
4. Access to the nets storeroom.
5. 11.6 m^3 fresh water tank below the net storeroom and the forward section of the cargo hold.
6. Cargo hold.
7. Cofferdam, below the cargo hold.
8. Fuel tanks with a volume of 16,386 m^3 each.
9. Sludge tank.
10. Access going up from the engine room to the main deck.
11. 1.95 m^3 fuel tank under the engine room.
12. Engine room.
13. Fuel tanks with a volume of 5.93 m^3 each under the engine room.
14. Primary engine.
15. Emergency exit from the engine room.
16. Ventilation.
17. Engine room storeroom.
18. Access to the engine room storeroom from the main deck.
19. 17.52 m^3 fuel tank.
20. Fuel tanks with a volume of 12.10 m^3 each.

2.1.5. *Characteristics of the trawling machines*

The main characteristics of the trawling machines that were on board F/V ROSAMAR are summarized in table 3.

Each machine included:

- A split watertight reduction gear, comprised of two piston/crown sets that operated in an oil bath by immersion.
- A fixed reel with a remotely operated pneumatically actuated brake and emergency local control.
- Automatic cable stowage with a torque limiter, which included a clutch and emergency control, which were both manually actuated.

Table 3. Main characteristics of the trawling machines

Brand	IBERCISA
Model	MAI-H/150/3300-22
Type	Hydraulic
Cable diameter	22 mm
Reel capacity	3,300 m
Launch	
1st layer	14.0 t
Half	6.5 t
Full	4.0 t
Speed	
1st layer	40 m/min
Half	85 m/min
Full	140 m/min
Oil pressure	250 bar
Oil flow	285 l/min

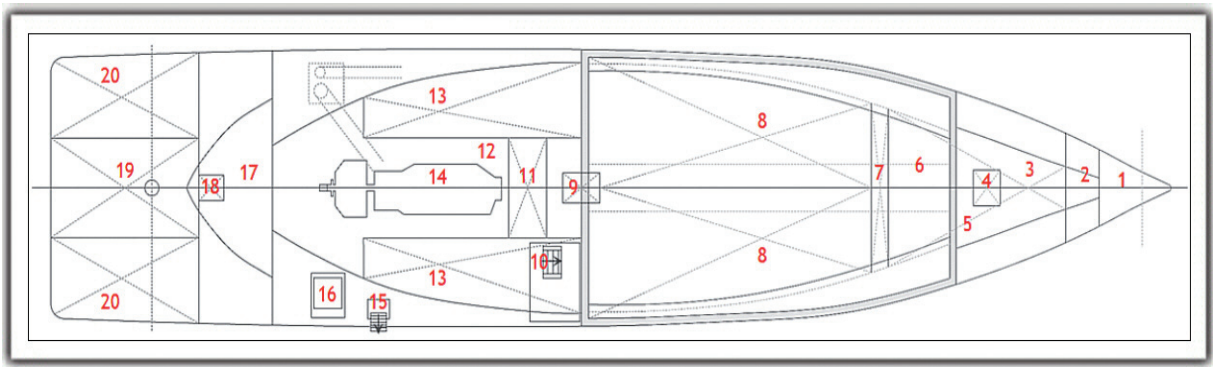


Figure 8. Lower deck

Figure 9 shows a trawling machine like the ones on board F/V ROSAMAR. The following main components can be seen:

- Reel:

  It is the cylindrical shaped drum that reels the cable.

- Cable stowage:

  This component moves lengthwise in a movement that is synchronized with the reel so that the cable is properly wound.

- Brake:

  This component allows for stopping of the reel, or preventing or slowing down its movement.

- Brake wheel:

  It is the component that actuates the brake.

- Force sensor:

  This component measures the force exerted by the reel on its anchoring and determine the tension supported by the cable.

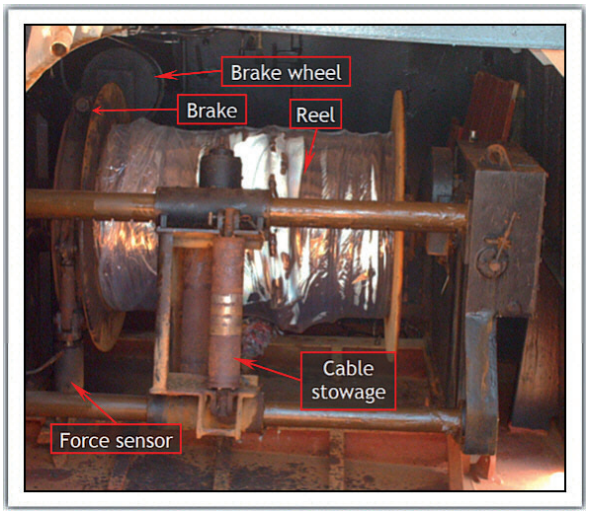


Figure 9. Main components of the trawling machine

2.1.5.1. *Trawling machine brakes*

The trawling machines on board F/V ROSAMAR included brakes like the one shown in figure 10.

Figure 10. Trawling machine brake

The brakes could be operated manually by means of a wheel, or from a distance by means of a pneumatic actuator. The actuating system on board F/V ROSAMAR can be seen in figure 11.

Figure 11. Trawling machine brake wheel with its actuator

2.1.5.2. *Manual operation of the trawling machines from the deck*

On the main deck, aft of each trawling machine there was a manual actuation lever, which can be seen in figure 12. The lever allowed for releasing and hoisting the machine cable by operating the clutch. When the lever was pulled out, the machine would begin to hoist in the cable and when the lever was pushed in, the machine began to release the cable; upon letting go of the lever, which was spring loaded to the neutral

position, the machine would stop. The speed of the machine when pushing or pulling on the lever was proportional to how far the lever was pushed in or pulled out and the maximum operating speed was obtained when the lever was completely pulled out or pushed in.

When the machine levers were in the hoisting position, traction tension was generated on the cables through the clutches. However, if this manual system was used during trawling to correct the location of the gear, the winding of the cables did not necessarily occur because when you added these tensions to those generated by the resistance of the moving gear, the resulting tension could change its direction. Since the tension was transmitted through the clutches, which allowed the reel to slide according to the direction of the resulting force, the cable reel could either wind or unwind the cable.

This operation was designed to require the person operating the machine to always be present when the machines were operating in manual mode. The levers were located on the ceiling to prevent a shifting of weights from accidentally moving them.

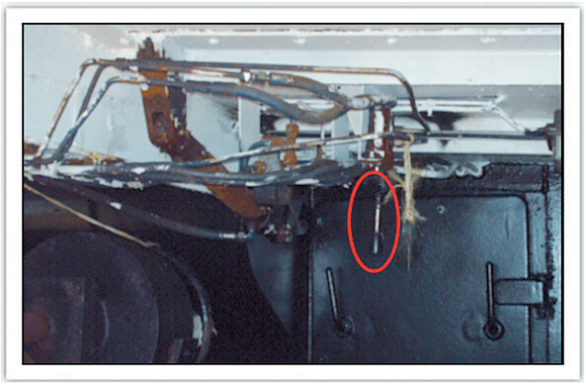


Figure 12. Trawling machines manual operating lever

2.1.5.3. *Trawling machines constant tension control system*

F/V ROSAMAR's trawling machines included a constant tension control system. The system measured the signal of the force exerted by each machine on one of its anchoring points to the deck. For this, it used a sensor that consisted in a traction/compression load cell, which can be seen in figure 13.

Figure 13. Trawling machine tension measurement force sensor

From the force sensor signal, the system determined the tension that each machine exerted on the trawling cable and automatically maintained a constant releasing or hoisting tension as required. This system could be disconnected from the wheelhouse or from the deck. The reference tension was adjustable.

Two indicators were located forward of the wheelhouse on the port side, where the Skipper could read the tension exerted by each machine on the trawling cable. These indicators, which can be seen in figure 14, included alarms that provided a warning when the reference tension, which was adjustable, was exceeded.

Figure 14. Tension indicators on the trawling machines, with adjustable alarm

2.1.5.4. *Remote operation of the trawling machines*

The trawling machines could be controlled using a remote operating panel located at the forward section of the wheelhouse. From that panel, which can be seen in figure 15 and 16, the following actions could be carried out:

Engage or disengage the machine brakes.

- Release or hoist the machine cables.
- Release or hoist the net drum.
- Operate the rudder.
- Connect or disconnect the constant tension control system.

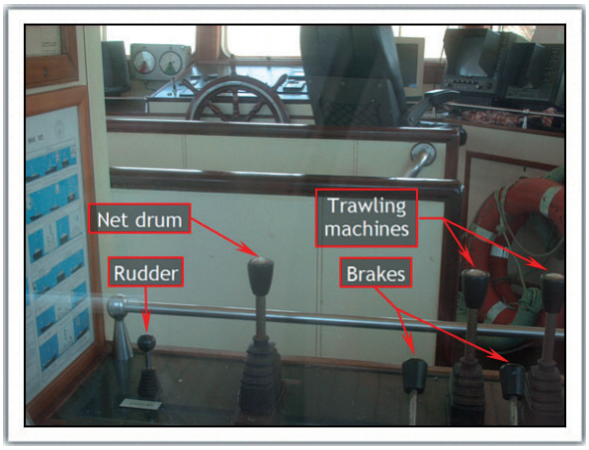


Figure 15. Forward view of remote operation from the wheelhouse

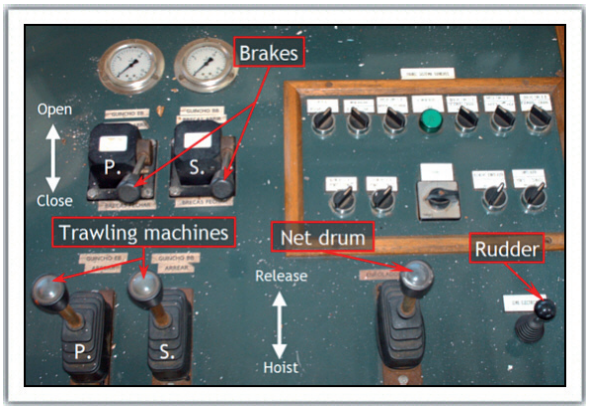


Figure 16. Remote operating panel located at the wheelhouse

2.1.6. *Characteristics of the trawling cables*

The main characteristics of the 22 mm in diameter, steel trawling cables used on this type of trawling vessel are the following:

Table 4. Main characteristics of the trawling cables

Material	Steel cable
Diameter	22 mm
Weight	1.6 a 1.9 kg/m
Minimum break load	25.5 a 29.5 t

2.2. The Company

At the time of the accident, the vessel belonged to the company PESCARIAS LABAYÉN Lda., based out of Matosinhos, Portugal.

The company was registered in Portugal although it belonged to three Spanish ship-owners from Burela, which is where the mishap vessel had her base port.

The vessel was operating off the coast of Lugo under the bilateral fishing agreement between Spain and Portugal, although all the fish, mainly hake and horse mackerel, was sold on the Portuguese market.

At the time of the accident, the company PESCARIAS LABAYÉN Lda was also owner of F/V PENÍNSULA, sister ship of F/V ROSAMAR.

2.3. The Crew

At the time of the accident, the crew was comprised of thirteen people, eight Portuguese nationals and five Indonesian nationals.

As a result of the accident, four crewmembers died and four others were declared missing.

The five survivors, four Portuguese and one Indonesian, were rescued and admitted to University Hospital Juan Canalejo of A Coruña with signs of hypothermia. Four of them (the Second Mechanic and Seaman no. 2, 3 and 4) were discharged from

the hospital that same day on the 5th of December, 2008, while the Cook was discharged the following day.

Of the four deceased crewmembers, three of them (the Skipper, the Fishing Skipper and the First Mechanic) were found during the initial rescue operations floating on top of some nets. The bodies were transported to the port of Burela. The fourth deceased crewmember (Seaman no. 1) was found by F/V NOVO LUAN on the 16th of December, 2008.

On the crew list that had been submitted, Seaman no. 1, a Portuguese national was listed twice and Seaman no. 8, an Indonesian national was not listed.

Table 5. Crew

Position on board	*Nationality*	*Status after the accident*
Skipper	Portuguese	Deceased
Fishing Vessel Skipper	Portuguese	Deceased
Cook	Portuguese	Survivor
1st Mechanic	Portuguese	Deceased
2nd Mechanic	Portuguese	Survivor
Seaman no. 1	Portuguese	Deceased
Seaman no. 2	Portuguese	Survivor
Seaman no. 3	Portuguese	Survivor
Seaman no. 4	Indonesian	Survivor
Seaman no. 5	Indonesian	Missing
Seaman no. 6	Indonesian	Missing
Seaman no. 7	Indonesian	Missing
Seaman no. 8	Indonesian	Missing

According to the dispatching of the vessel, at the time of the accident, all the crewmembers were in possession of the current titles and certificates required for carrying out their duties on board the vessel.

Table 5 provides a summary of the positions, nationalities and status of the crewmembers after the accident.

2.4. Maritime weather conditions

In the "Study regarding the maritime weather conditions during accidents involving vessels - Vessel: ROSAMAR" carried out by CEDEX in January, 2009, states that at the time and location of the accident the estimated conditions were the following:

Table 6. Estimated meteorological and sea conditions at the time and location of the accident

Wind direction	WNW
Wind speed	20 to 27 knots
Significant wave height	6 a 7 m
Wave direction	NW
Average wave period	7 to 9 s
Wave peak period	12 to 15 s

It is worth mentioning that:

- The existing wind speeds were not extreme for that maritime area, but were relatively strong.
- At the time of the accident, the clouds were variable, with intermittent showers and regular visibility.

* * *

Chapter 3. THE ACCIDENT

The following chronological events have been drafted by comparing the statements provided by the crew and the available documentation. The stated times are approximate and UTC.

3.1. 5th of December, 2008

At 03:30 hours, F/V ROSAMAR left the port of Burela, to carry out trawl fishing in an area located at approximately 24 miles north of Burela.

At 07:00 hours, they released the gear and began fishing in an area 450 m deep. At that time, the sun had already risen.

After launching the gear, the skipper was at the wheelhouse, the First Mechanic was in the engine room, the Fishing Skipper was on the upper deck and Seaman no. 4 was on the bow. The rest of the crew was lying down or resting, waiting for the trawl to finish so they could continue with their work.

At about 07:15 hours UTC, they were operating at a depth of 250 m. The vessel was trawling towards the East and they had released about 960 m of cable. Suddenly, the fishing gear snagged.

The Skipper stopped the vessel and gave three warning calls for the crew to come up and hoist the gear.

The Fishing Skipper went down to the main deck and attempted to access the fishing machines, but he was not able to do so due to the amount of water that was entering the fish processing area through the doors communicating it with the machines. These doors for accessing the machines from the fish processing area were usually open.

Seaman no. 3 went to the fish processing area and witnessed how the Fishing Skipper was not able to access the trawling machines. The fish processing area deck was flooded and the water was running down to the engine room. Some sea surges caused the waves to come in over the deck, flooding the inside of the vessel. As the bow was sinking, the heeling towards the port side increased.

None of the crewmembers closed the doors that accessed the fishing machines from the fish processing area, or the door used for accessing the fish processing area from the engine room.

The engines shut down and the emergency lighting came on.

The First Mechanic came up from the engine room to the main deck and went to his berthing, where he woke up the Second Mechanic who was sleeping after having finished his watch at 06:30 hours. The berthing deck was flooded. They both put on their life vests and went up the interior ladder to the wheelhouse.

The Fishing Skipper and Seaman no. 3 went from the fish processing area to the wheelhouse, via the interior ladder. Once there, they put on their life vests, as did the Skipper.

Seaman no. 2, who was lying down but not asleep, went from his berthing to the wheelhouse via the interior ladder but did not put on his life vest.

In order to climb the interior ladder, crewmembers had to step on the side and support themselves on the ceiling because the vessel had considerably heeled towards her port side.

The Second Mechanic was able to cut the starboard life raft line with assistance from Seaman no. 2. The port life raft was not able to be used because it was located under water due to the heeling of the vessel. Afterwards, rescue units found the life raft afloat.

Seaman no. 3 jumped overboard and lost his life vest because he had not fitted it properly. He swam and held on to a wooden pallet.

The waves pushed the Second Mechanic overboard near the life raft, but he was not able to

reach it. He swam and was able to hold on to the same pallet as Seaman no. 3. They both remained in that predicament until they were rescued two hours later.

Seaman no. 4 grabbed a buoy and jumped overboard. He was not wearing his life vest. He held on to the life raft and remained in that position until he was rescued. The Cook was also able to reach the life raft.

The survivors had thought that no one was left inside the vessel but when she was sinking, in a vertical position with the bow facing upward, they saw two shipmates on the forward railing but they were not able to identify them. These two crewmembers went down with the ship.

The blue box transmitted its last signal at 07:30 hours UTC, at position I: 44º 06.96' N; L: 007º 27.5' W. At 07:45 hours UTC, the radio beacon signal from F/V ROSAMAR was received at position I: 44º 05.3' N; L: 007º 18.4' W.

None of the crewmembers broadcast the emergency via radio or any other means.

We are only certain that five of the thirteen crewmembers were wearing their life vests, and one of them lost the vest when he jumped into the water because he was not wearing it properly.

Only one of the survivors was wearing his life vest at the time they were rescued.

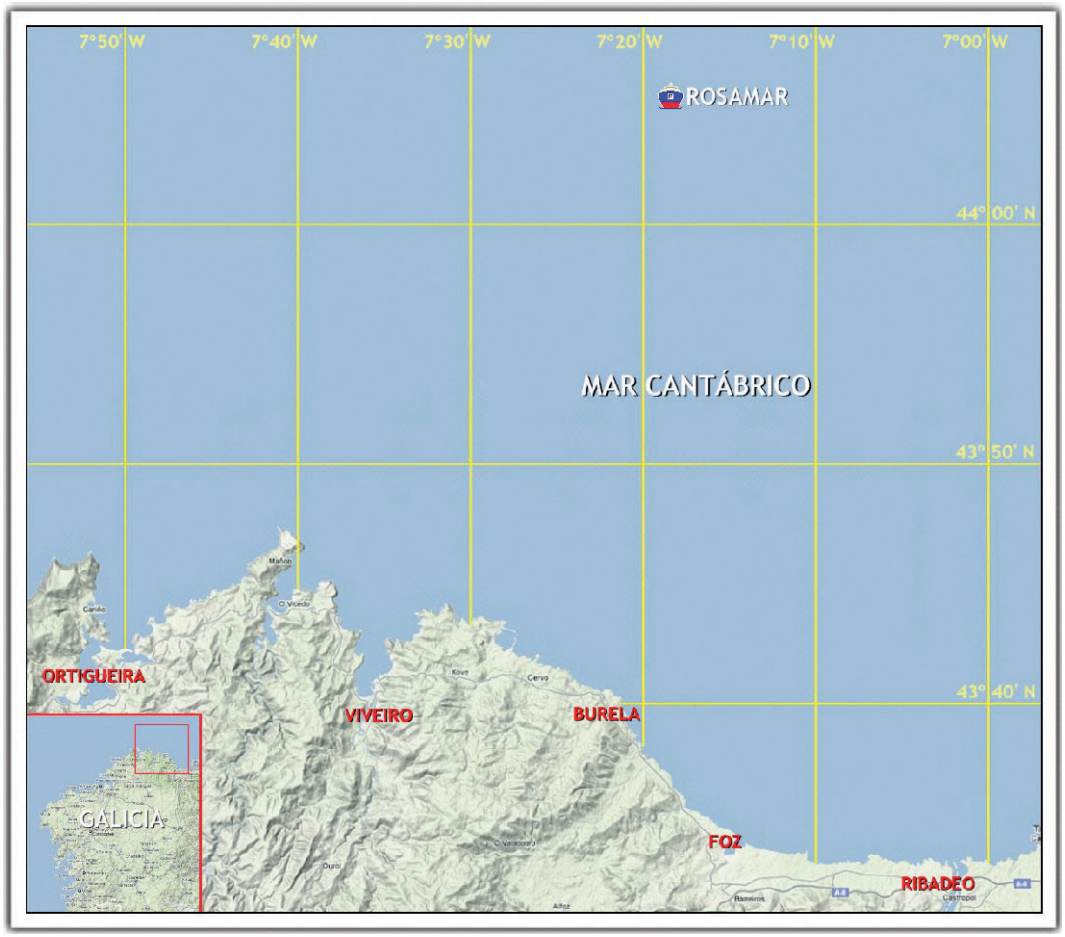


Figure 17. Approximate location of the sinking of F/V ROSAMAR

* * *

Chapter 4. THE RESCUE

In accordance with the General Emergency Report 4976/08, issued by SASEMAR, the rescue operations were carried out chronologically, in UTC time and in the following manner:

4.1. 5th of December, 2008

07:45 MRCC Madrid received a 406 MHz radio beacon alert, originating from SPMCC Maspalomas and identified as belonging to Portuguese F/V ROSAMAR at position I: 44º 05.3' N; L: 007º 18.4' W.

07:55 R/H PESCA II was dispatched.

08:00 R/V SALVAMAR ALIOTH was dispatched.
RCC A Coruña was notified for them to transmit the MAYDAY RELAY signal. R/V SALVAMAR ALIOTH departed from its base in Burela.
R/V SALVAMAR SHAULA reported that they had spoken to a person who identified himself as a non-enrolled crewmember of F/V ROSAMAR, who was certain that the vessel was anchored at Burela.
The person hired by the ship-owning company to watch over F/V ROSAMAR when it was in port was contacted, and he said that the vessel was anchored at Burela.
The ship-owner was contacted and he confirmed that the vessel was at sea.

08:50 F/V ROSAMAR was called via satellite but no response was received.

09:04 The departure of R/H PESCA II was reported.

09:40 R/H HELIMER 203, with its base in Gijon was alerted because R/H HELIMER GALICIA was down.

09:47 R/H PESCA II found oil spots and fuel in the area.

09:48 R/A SASEMAR 102 was dispatched.

09:58 R/H HELIMER 203 was dispatched.

09:59 R/H PESCA II found a life raft and began rescuing the survivors that were inside the raft.

10:05 R/V MARIA DE MAEZTU was dispatched.

10:15 R/H HELIMER 203 took off.

10:26 R/H PESCA II reported that they had rescued three survivors with hypothermia and there were two bodies floating on top of some nets, and one of them was wearing his life vest. Subsequently, they found and rescued two crewmembers who were holding on to a pallet and whom were also experiencing signs of hypothermia. R/H PESCA II was directed to land at the A Coruña airport with the survivors.

10:52 R/V SALVAMAR ALIOTH located three bodies on top of some nets and picked them up.

10:53 R/V IRMANS GARCIA NODAL was dispatched.

11:07 R/V SALVAMAR ALIOTH reported they had one of the deceased on board.
R/H HELIMER 203 arrived at the location of the accident.
It was requested that the MAYDAY RELAY and PAN PAN transmissions be cancelled.

11:34 R/H PESCA II landed at the airport of A Coruña and the five survivors were transported in an ambulance to University Hospital Juan Canalejo of A Coruña.

11:38 R/H SASEMAR 102 arrived at the location of the accident.

12:00 R/H HELIMER 203 returned to its base in Gijon to change crews and refuel.

12:40 R/H PESCA II took off and headed towards the location of the accident.
R/V SALVAMAR ALIOTH reported having two deceased crewmembers on board and had lost track of a third body.
R/V SALVAMAR ALIOTH reported that they had located another body.

13:07 MRCC Lisbon reported that the last crew list that they had was from the 16th of September, 2008, which listed 16 Portuguese crewmembers, one Spanish Boatswain and no Indonesian crewmembers.

13:13 R/V SALVAMAR ALIOTH reported that they had three deceased persons on board.
It was reported that R/H HELIMER 203 was taking off, but the takeoff was cancelled until further notice.

13:31 It was once again requested that R/H HELIMER 203 take off, which it subsequently did.
R/H PESCA II departed the area of the sinking.

15:10 R/V SALVAMAR ALIOTH departed the area of the sinking.

15:15 R/V SALVAMAR SHAULA arrived at the area of the sinking and R/V SASEMAR 102 left the area.

17:05 R/V SALVAMAR SHAULA reported that visibility in the area was poor.

17:28 R/A SASEMAR 102 returned to the base due to poor visibility.

17:41 R/V SALVAMAR SHAULA was instructed to return to her base.
R/V SALVAMAR ALIOTH arrived at Burela.

18:56 R/H PESCA II was instructed to return to its base.

20:00 R/H HELIMER 203 was informed that it could return to its base since R/H HELIMER GALICIA was once again operational.

4.2. Days 6th, 7th, 8th and 9th of December, 2008

R/A SASEMAR 102, R/V MARIA DE MAEZTU and R/V IRMANS GARCIA NODAL continued to search the area of the accident while the visibility conditions were adequate. During those days they found remains of the shipwreck, which consisted of:

- 1 life raft for 6 people, unlabelled, with Portuguese inspection tags.
- 1 life vest with the lettering "ROSAMAR LEIXOES".
- 6 fishing gears with different sections.
- 5 fishing float clusters.
- 5 deck gratings.
- 1 piece of drift wood 30 m long.
- One 208 l drum full of lubricating oil.

All the recovered items were delivered to the ship-owner.

On the 9th of December, 2009 at 19:45 hours the PAN PAN signal was no longer transmitted.

4.3. 10th of December, 2008

Different Civil Protection groups were mobilized between Viveiro and Ribadeo to conduct searches along the coastline, and R/A SASEMAR 102 continued to search the area of the accident.

F/V NUEVO CEDEIRA picked up a life buoy belonging to F/V ROSAMAR from the water.

4.4. 11th of December, 2008

Assets were mobilized to search the coastline on the ground but no remains of the shipwreck were found.

4.5. 15th and 16th of December, 2008

R/V SALVAMAR ALIOTH and R/A SASEMAR 102 were mobilized to search the coast. No remains of the shipwreck were found.

On the 16th of December at 13:52 hours, F/V NOVO LUAN found a body in the net when they were operating in the area where the accident occurred. That same day at 16:07 hours, the body was transferred to R/V SALVAMAR ALIOTH, which in turn delivered it to the investigative police in Burela at 18:45.

4.6. 17th of December, 2008

R/V SALVAMAR SHAULA departed the area of the accident.

The body that had been found the day prior was identified as Seaman no. 1, of Portuguese nationality.

4.7. 25th of December, 2008

On the 25th of December, 2008, the search operations were ceased and Seaman no. 5, 6, 7 and 8, all of Indonesian nationality, were declared missing.

* * *

Chapter 5. ANALISYS OF THE ACCIDENT

5.1. Causes of the accident

From the analysis of the accident, which is detailed below, we have concluded that it was caused by:

- The fishing gear getting snagged.
- The trawling machines continued hoisting after the gear got snagged due to one of the following reasons:
  - 1st hypothesis: The trawling machines were operating in manual mode, without any of the crewmembers controlling them.
  - 2nd hypothesis: The trawling machine's constant tension control was turned on and they suffered a failure, which prevented them from being disconnected.
- The trawling machine controls that were located at the wheelhouse were not used.
- The tension of the machine's cables was such that the vessel's stern sank, resulting in the flooding of the fishing area. Three factors contributed to the flooding:
  - The doors used to access the fishing machines from the fishing area were left open, which was a normal practice in this vessel.
  - The sea surge and the waves coming in over the stern and the port area contributed to the flooding.
  - The hatch used for accessing the fish processing area from the upper deck opened inward and it was held by a hydraulic locking system. This way, the hydrostatic pressure of the water that accumulated on the upper deck when the stern sank, caused the hatch to open and the fishing area to flood.
- The minimum break load of the cables was high enough for these not to break during the accident.
- The engine room flooded because the door for the stairs that communicated the fishing area with the engine room was left open.

5.2. Preliminary considerations

Before analyzing the accident, it is advisable to carry out some preliminary considerations regarding the snagging of the gear and the vessel's load condition.

5.2.1. *Snagging of the gear*

Figure 18 shows a diagram of a bottom trawl fishing gear.

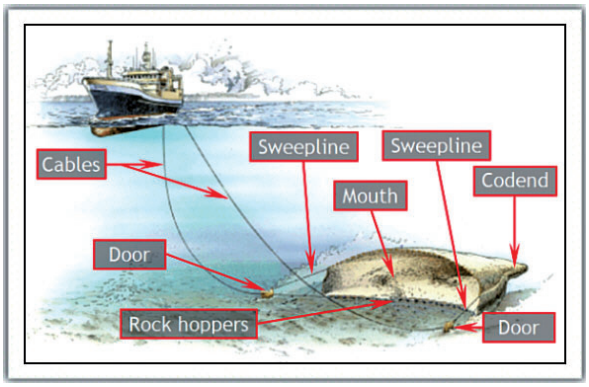


Figure 18. Bottom trawl gear

The following items are depicted in the figure above:

- Cables:

  They connect the trawling machines with the doors. They are used to tow the gear and control the depth of the doors.

- Doors:

  They are heavy and appropriately shaped pieces that control the horizontal opening and the positioning of the net. Figure 19 shows a door like the ones on board F/V ROSAMAR.

- Sweeplines:

  Items used for joining the doors with the net.

- Rock hoppers:

  It is the bottom part of the net, which is in contact with the bottom of the ocean. It is designed to roll whenever possible over the bottom of the ocean.

- Mouth:

  It is the front part of the net.

- Codend:

  Back part of the net, where the net closes. The codend is where the catch is retained.

Figure 19. Fishing door

When a bottom trawl gear gets caught on an obstacle or gets buried in the ocean floor while it is being towed and becomes trapped this is referred to as snagging.

The main causes of snagging are:

- One or both doors get caught on an obstacle located on the ocean floor.
- The rock hoppers or sweeplines get caught on an obstacle located on the ocean floor.
- The rock hoppers get buried in the ocean floor.

Snagging of the net is a dangerous situation where a part of the gear is fixed and, since it is not moving, no resistance is generated as the gear moves forward. Under these circumstances, the tension exerted on the cables, generated by the traction of the fishing machines and the movement of the vessel is transferred to the stern. For all practical purposes, it is like adding a weight to the stern equivalent to the force generated by the tension. This causes the stern to sink and modifies the vessel's trim.

When faced with this situation, one must put safety before the recovery of the gears; stop the vessel and avoid dangerous manoeuvres in an attempt to liberate the gear.

The standard manoeuvres for unsnagging the gears consist of hoisting and releasing the cables in a controlled fashion and carrying out adequate zig-zag manoeuvres.

5.2.2. *Load condition at the time of the accident*

According to statements provided by the crew, the vessel's load condition at the time of the accident was the following:

- Fuel:

  The engine room double bottom fuel tanks were full. The rest of the fuel tanks were at 50% of their maximum capacity. Under these conditions, the vessel was carrying approximately 48 m^3 of fuel.

- Fresh water:

  The fresh water tank was full, which meant it was carrying 11 m^3 of fresh water.

- Gears:

  There were 4 complete fishing gear sets on the upper deck. The weight of these gears as per the stability test was 6 t.

- Cargo in the hold:

  There were no fish in the hold since they were conducting their first setting of the day.

- Ballast water:

  The forepeak was full of ballast water. This condition was listed in the vessel's stability

book and accepted by the Portuguese maritime authorities. Under these conditions, it was carrying approximately 3.5 m^3 of ballast water.

- Solid Ballast:

  The vessel had 19 t of solid ballast, of which 14 t were in the keel and the engine room and 5 t at the forepeak.

5.3. Analysis of the accident

From the statements provided by the crew, we can conclude that the event that caused the accident was the snagging of the gear while they were trawling in an area of approximately 250 meters in depth.

When they became aware of the dangerous situation, the Skipper stopped the vessel and gave three warning calls for the crew to come up and unsnag the gear.

The trawling machines continued the hoisting without any crewmember controlling or stopping them. The tension of the cables increased because the machines were hoisting and the gear was stuck on the bottom. As a consequence of the increased cable tension a descending vertical force was generated, which sank the stern.

The sinking of the stern and the existing sea conditions contributed to the flooding of the fish processing area and the engine room.

None of the crewmembers was able to reach the trawling machines, nor did anyone use the existing controls that were located at the wheelhouse; no one closed the door communicating the trawling machines with the fish processing area or the door communicating the fish processing area with the engine room.

During the flooding, the stern sank even further and the vessel strongly heeled to her port side.

With the stern submerged and the watertight doors open, the vessel's stern section progressively flooded. Finally, the vessel assumed a vertical position with her stern under water and her bow above water and then sank in that position.

The following aspects of the accident are analyzed below:

- The procedures used for operating the trawling machines at the time of the accident for the purpose of determining the reason why the machines continued hoisting after the gear had gotten snagged.
- The effects of the hoisting for the purpose of establishing if the hoisting of the machines was sufficient to sink the vessel.
- The effects of the waves, for the purpose of determining the influence that the waves had on the accident.

5.3.1. *Method in which the trawling machines were being operated at the time of the accident*

During the fishing manoeuvre, the machines can be operated in the following manners:

- With brakes applied.
- In manual mode.
- With the constant tension control engaged.

5.3.1.1. *Machines with brakes applied*

In this condition, the trawling force exerted on the cable during the fishing is generated only by the resistance of the gear as it is being towed by the vessel.

Fishing with the brakes applied to the machines is unusual because it is difficult to maintain a constant speed in order to keep the gear stable in adverse sea conditions.

If the machines had the brakes applied during the accident of F/V ROSAMAR when the gear got snagged and the vessel had stopped, the tension in the cables would have dropped drastically and the force required for sinking the stern would not have been generated. Therefore, it can be

ruled out that the vessel was operating under those conditions.

5.3.1.2. *Machines operating in manual mode*

Operating the machines in manual mode required that crewmembers be present next to the machines or at the controls for the machines that were located in the wheelhouse. Since at the time of the accident, none of these conditions were met, it was thought that this could not have been the operating mode of the machines during the accident. However, after having visited F/V PENNINSULA, sister to the mishap vessel, it was interesting to see that next to the manual operating lever for the trawling machines there was a piece of rope that was used for holding the lever in several hoisting positions, as can be seen in figure 20. The use of this rope allowed the crew to momentarily leave the lever in a hoisting position while they left the area to carry out other tasks.

It is not common to use the machines in manual mode after having tightened the cables at the desired depth for fishing, although sometimes, it was used to make corrections in the gear. If at the time of the accident, these manual hoisting levers had been engaged and held with a piece of rope, without any crewmember having control over them, it would have been impossible to stop hoisting without untying the ropes from the levers. This would explain why the Fishing Skipper did not go to the machine controls that were located at the wheelhouse but instead, was trying to reach the spaces next to the machines. This would also explain why the machines continued hoisting after the gear got snagged. This is the first hypothesis that would explain the causes of the accident.

5.3.1.3. *Machines with the constant tension control engaged*

In this condition, the machines automatically maintain a constant tension of the chains.

In bad sea conditions, the movements of the vessel causes the machine to constantly act and sometimes in an abrupt fashion. For this reason, many fishermen do not like to use the constant tension control under these circumstances.

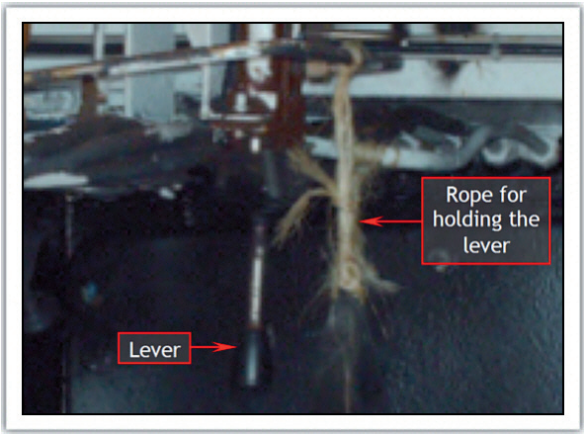


Figure 20. Piece of rope used to hold the trawling machine's manual operating lever

If when the gear gets snagged and the machines are operating with the constant tension control engaged, the tension applied to the cable would not cease and this tension would in turn be transmitted to the vessel, sinking her stern, just as occurred to F/V ROSAMAR. If at the time of the accident, the machines had been operating with the constant tension control engaged and this system would not have malfunctioned, it would have sufficed if the Skipper or the Fishing Skipper had disconnected it from the panel located at the wheelhouse, which was easily accessible, and the machines would have stopped hoisting. However, the fishing Skipper did not attempt to access the machine's controls that were located at the wheelhouse upon realizing that he could not reach the fishing machines, and the Skipper did not use said controls. Therefore, it is considered that at the time of the accident, the constant tension control system was either disconnected or it malfunctioned and could not be disconnected; the latter would be the second hypothesis explaining the causes of the accident.

5.3.2. *The effects caused on the vessel due to the hoisting of the machines*

As has already been mentioned, when the gear gets snagged and hoisting continues, the tension

on the cables generates forces on the snatch blocks that are broken down into horizontal forces, which push the vessel towards the location where the gear got snagged, and vertical forces that push the stern downward.

Figure 21 shows the point where the vertical forces act upon one of the snatch blocks.

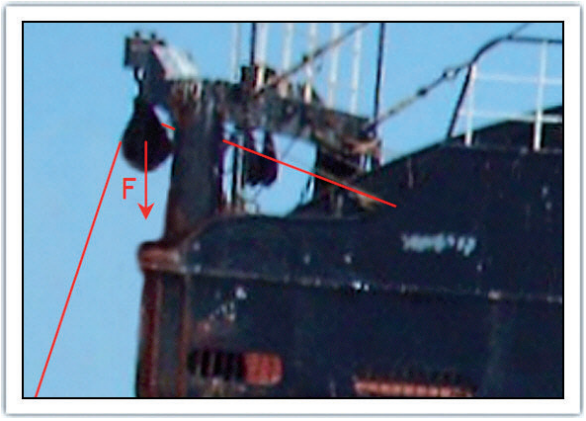


Figure 21. Downward vertical force generated by the machine's hoisting after the gear getting snagged

The approximate draught conditions that the vessel would have had in calm seas as the total vertical force applied to the gear's snatch blocks was increasing, has been calculated. To accomplish this, we have used the vessel's stability test data and the load condition at the time of the accident according to the statements provided by the crew.

The result of this calculation is shown in figure 22, where the red line corresponds to the draught of the stern perpendicular, the green line to the draught of the bow perpendicular and the blue line to the average draught.

The crew noticed that a lot of water was entering the fish processing area through the doors used for accessing the trawling machines. The drains in the area where the trawling machines were located, which can be seen in figure 23, were adequate for draining this area. Therefore, the sea level at the time of the accident had to reach the lower part of the doors used for accessing the fish processing area, with a draught at the stern perpendicular of approximately 4 m.

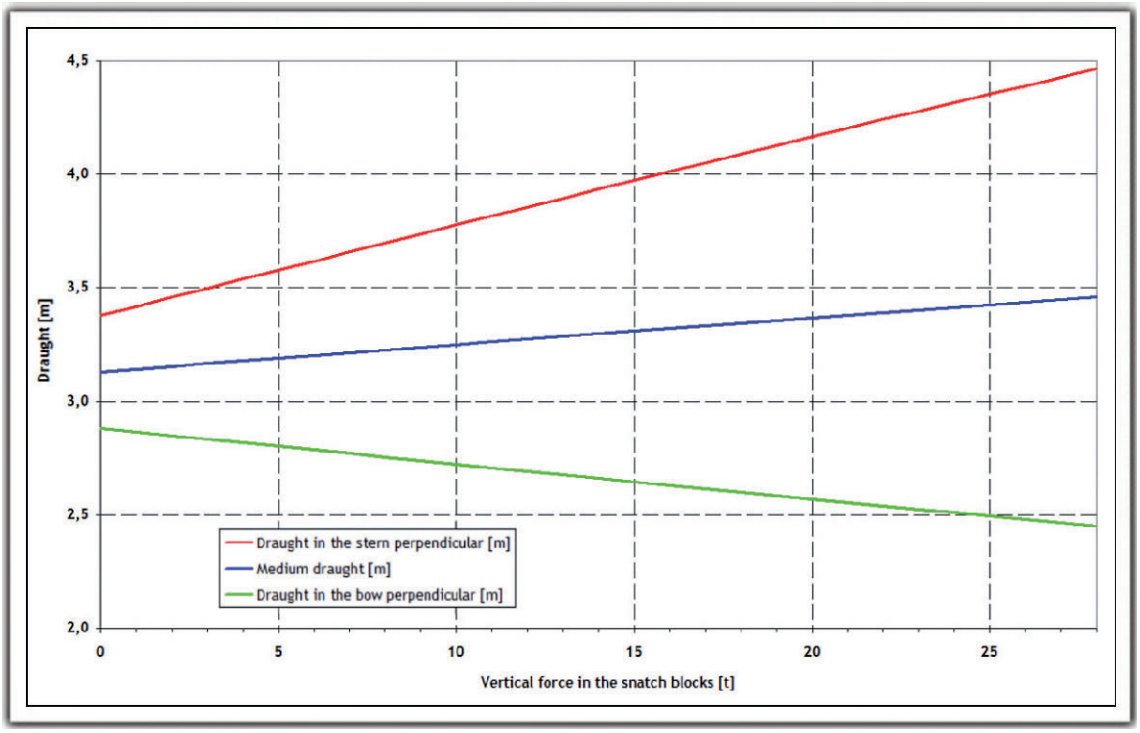


Figure 22. Vessel's draughts in calm seas according to the vertical forces acting on the snatch blocks

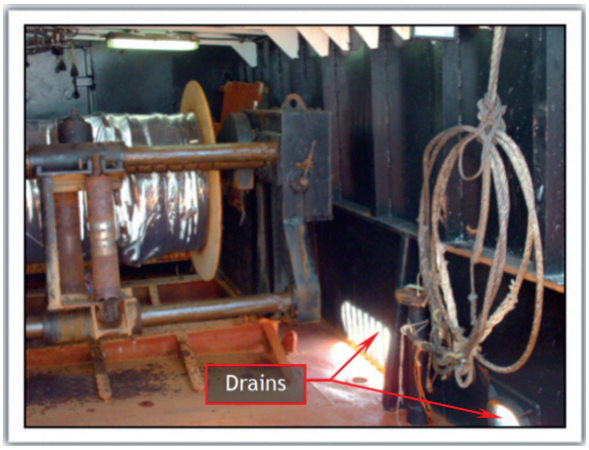


Figure 23. Drains in the area near the machines

In the graph of figure 22, we can see that the draught of the stern perpendicular of approximately 4 m in calm seas corresponded to a vertical force acting on the snatch blocks of approximately 16 t, which meant 8 t on each snatch block.

The maximum pull of each machine was 14 t, and therefore, it was possible to generate a vertical force of 8 t on each snatch block, in the mode in which the machines of F/V ROSAMAR were operating in, with the reel below its average capacity. The minimum break load for the type of cable used on board the vessel was 25.5 t, which was not exceeded by the machine's pull and therefore the cables did not break.

The calculations that have been carried out correspond to the vessel in calm seas and under ideal load conditions. The movements generated by the waves were aiding the sinking of the stern and the flooding of the fish processing area. The flooding increased due to the impact of the waves or sea surges, as per statements made by the crew.

The diagram of figure 24 shows the values of the transverse and longitudinal metracentric heights of the vessel in calm seas as the total vertical force applied to the snatch blocks increased. We can see that the metacentric height values de-

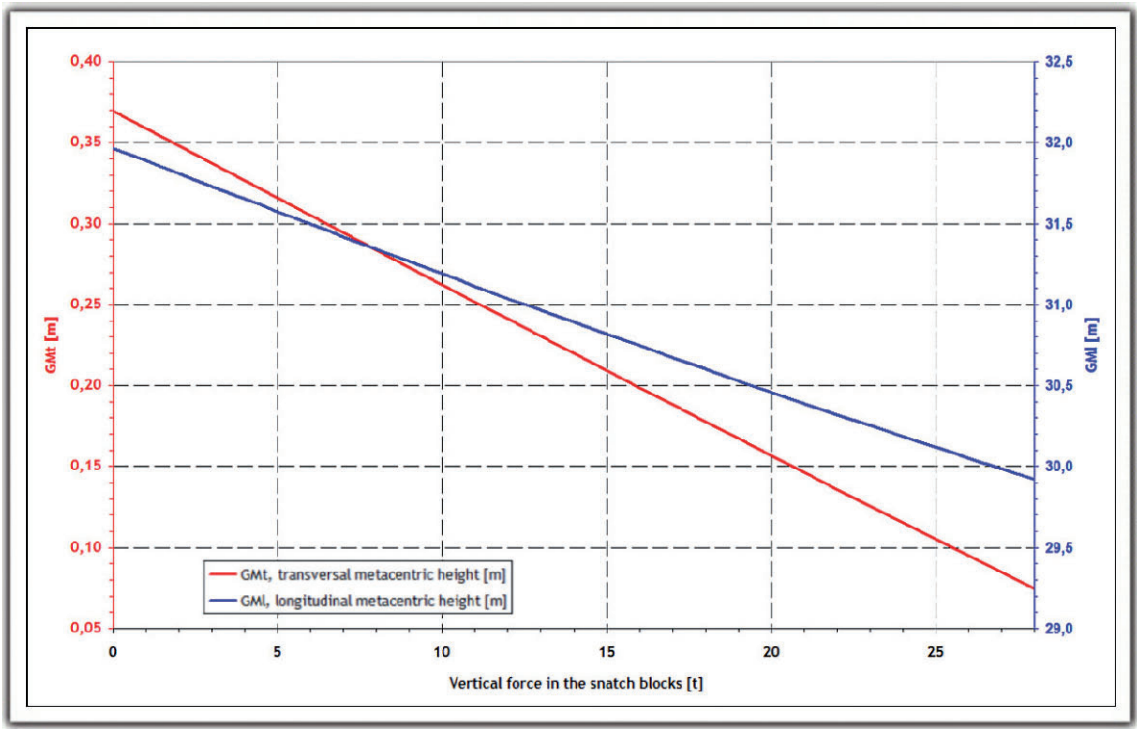


Figure 24. Transverse and longitudinal metracentric heights of the vessel in calm seas according to

crease as the force acting upon the snatch blocks increases.

5.3.3. *Effects of the waves on the vessel*

The waves had the following effects on the vessel:

- Generated pitch movements, which caused the stern to sink and increased the flooding.
- The impacts of the waves on the stern contributed to the flooding, especially on the port side.
- Waves coming over the port side since they were approaching from the NW and the vessel was trawling with an Eastward heading. When the gear got snagged and the vessel stopped, the waves where pushing the vessel towards starboard, pushing her away from the location where the gear had gotten snagged. Therefore, the cables were pulling on the snatch blocks towards port and this was the reason why the vessel heeled towards that side.

5.3.4. *Flooding of the vessel*

The progressive flooding of the fish processing area and the engine room caused the stern section to sink further as time went by. The sinking of the stern also contributed to the flooding and as the flooding increased, the values of the transverse and longitudinal metacentric heights decreased. The consequence of this was the increased heel and trim of the vessel towards her port side and her stern. The result of the process was the sinking of the vessel, heeling towards her port side and with her bow above water.

The following events contributed to the progressive flooding of the vessel.

- None of the crewmembers closed the doors used for accessing the fishing machine from the fish processing area, which opened outward.
- None of the crewmembers closed the door used for going down to the engine room from the main deck.
- The hatch used for accessing the fish processing area from the upper deck opened inward and it was held by a hydraulic locking system. This way, the hydrostatic pressure of the water that accumulated on the upper deck when the stern sank caused the hatch to open and the fishing area to flood.

Figure 25. Fastening hardware for the door used for accessing the fish processing area from the upper deck

If the aft door of the fish processing area and the door for the access ladder going down to the engine room had been closed, since these are watertight doors, the progressive flooding would have been avoided. In this configuration, the vessel could have been saved if the heeling towards port caused by the effects of the waves had not become so severe as to cause the progressive flooding of the vessel through other important openings.

5.4. Details of the rescue

During the rescue operations, the following events worth mentioning occurred:

- Early reports stated that the vessel was anchored at Burela, although ultimately the shipowner confirmed she was at sea. This fact did not affect the efficiency of the rescue.
- R/H PESCA II was alerted at 07:55 UTC but it did not take off from the A Coruña airport until 09:04 and located the first remains of the accident at 09:47.

The reason why the aircraft was delayed in taking off was because the R/H PESCA II was operating from the A Coruña airport, which is not its home base, and for the purpose of providing greater coverage to the Galician coast since R/H HELIMER GALICIA was down for periodic maintenance. Only one crew for R/H PESCA II had travelled down to A Coruña and they were resting at a nearby airport at the time they were notified. The travel to the airport and the pre-flight paperwork increased the response time.

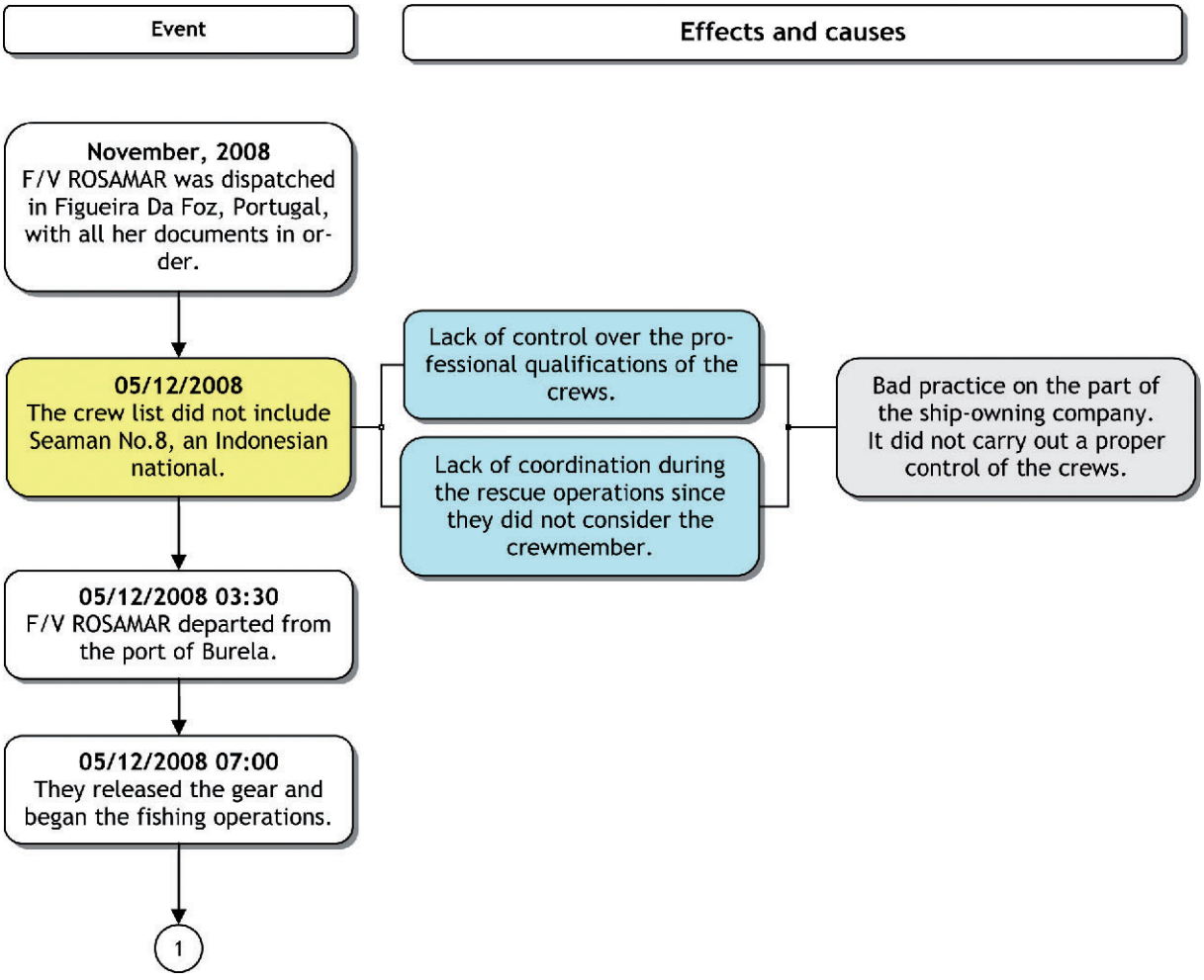
5.5. Chronological analysis of the accidental events related to safety and the rescue

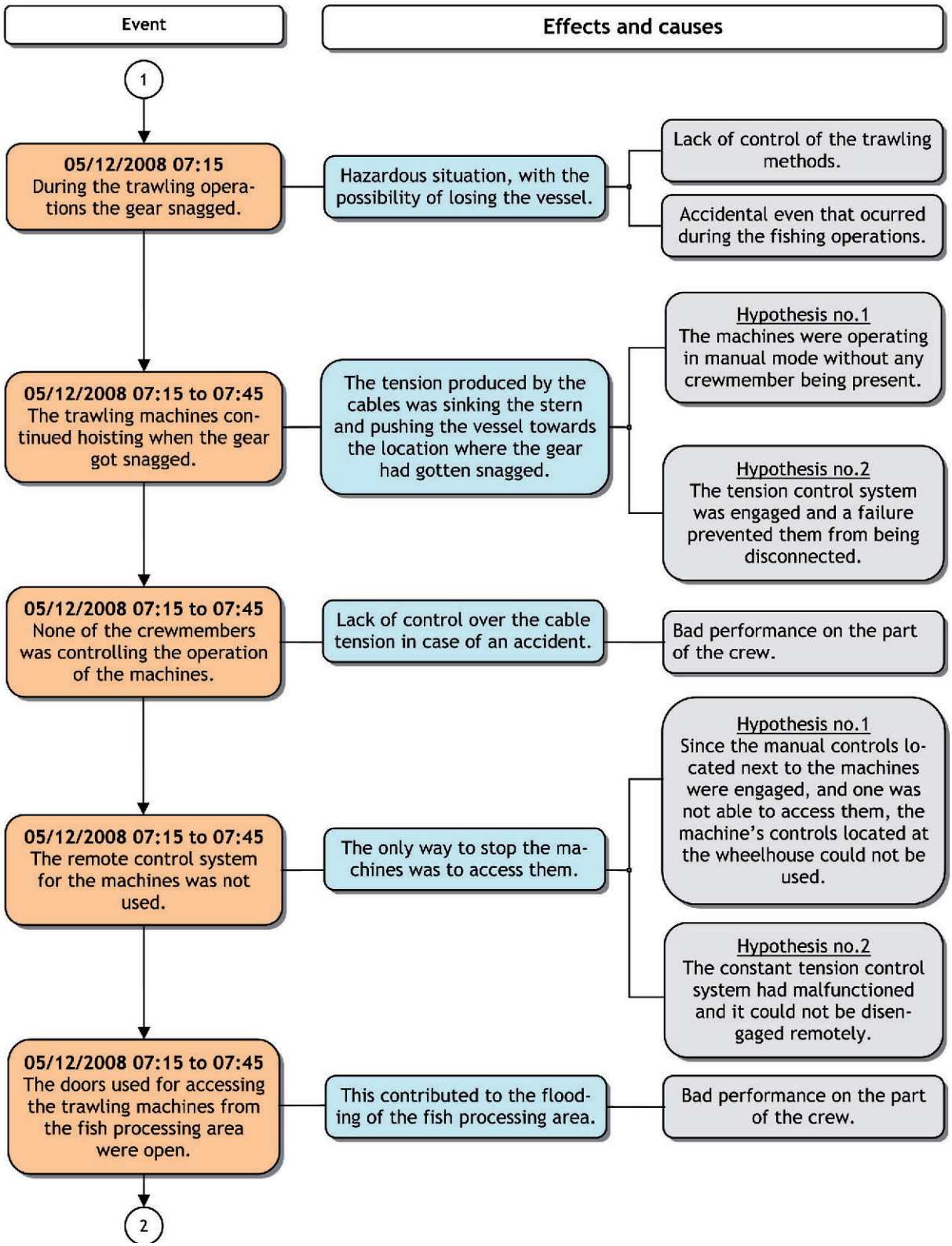
An analysis of the events that affected the safety and effectiveness of the rescue, referencing their effects and the causes that provoked them are described below. The effects are listed with a blue background and the causes with a grey background.

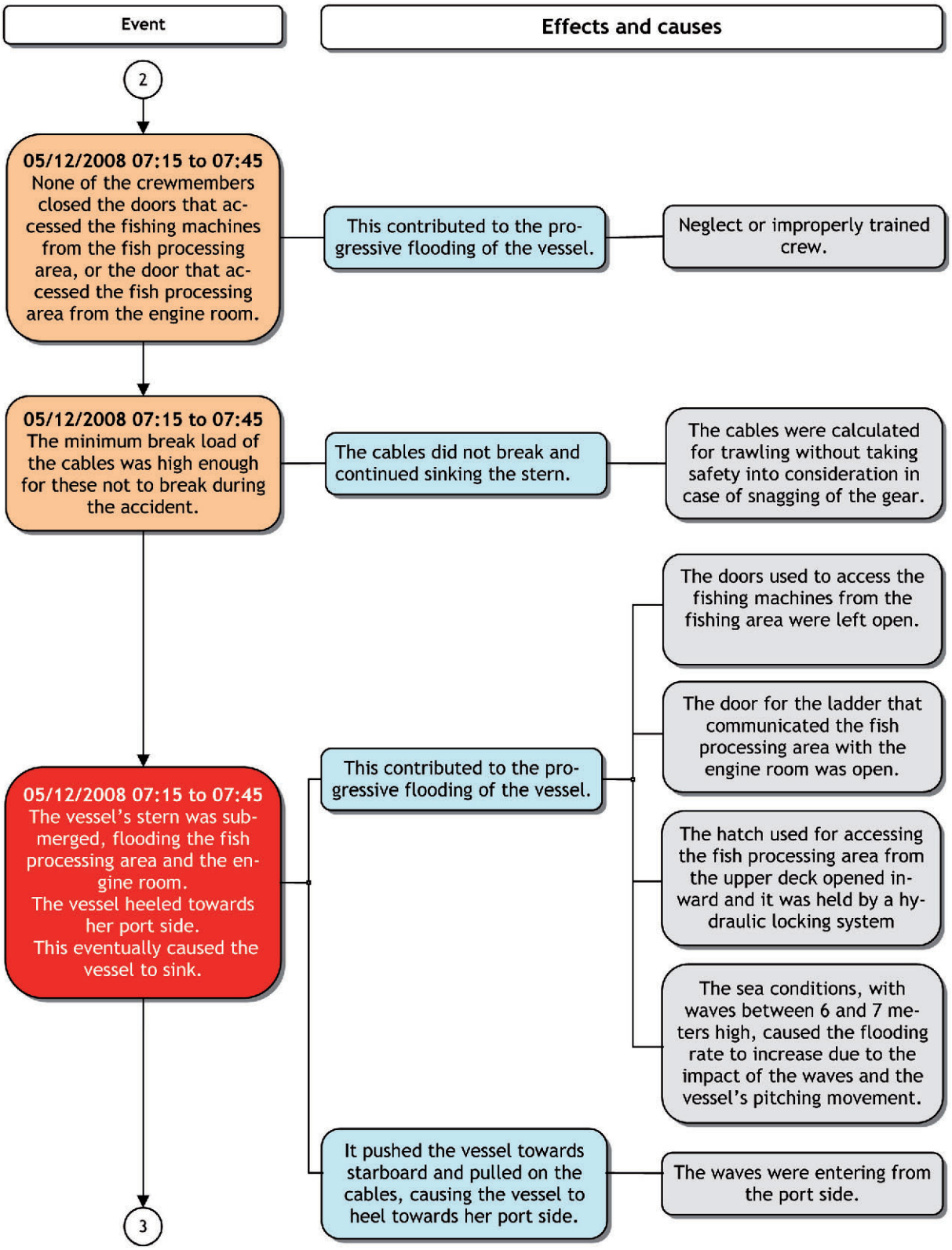
The times listed are approximate and UTC.

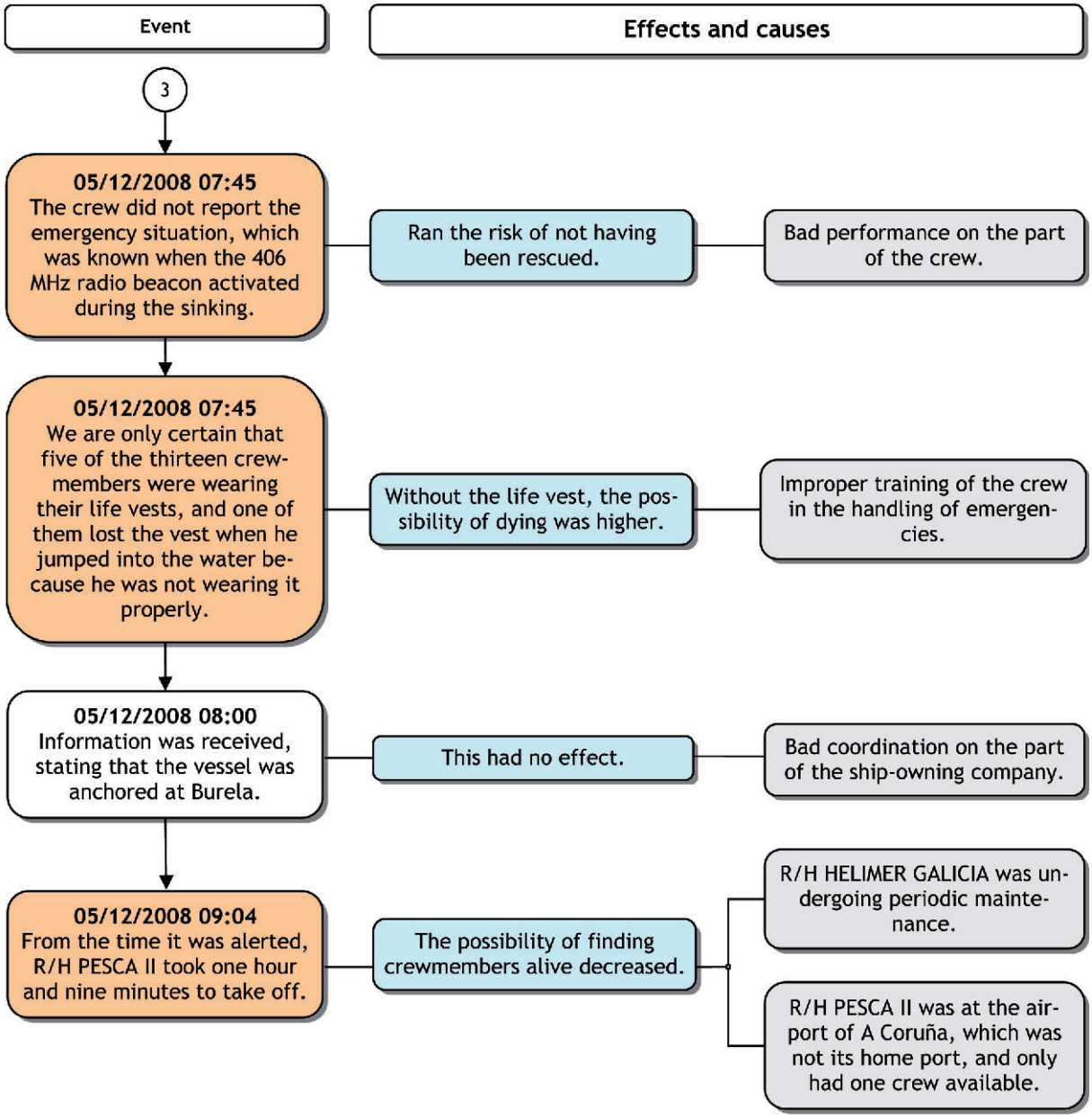
The events have been divided into:

- Events that affected safety and caused the accident. These events are listed with a red background.
- Events that affected safety and contributed to the accident. These events are listed with an orange background.
- Events related to safety and were neither the cause of nor contributed to the accident. These events are listed with a yellow background.




Event
Effects and causes
1
05/12/2008 07:15
During the trawling operations the gear snagged.
Hazardous situation, with the possibility of losing the vessel.
Lack of control of the trawling methods.
Accidental even that ocurred during the fishing operations.
05/12/2008 07:15 to 07:45
The trawling machines continued hoisting when the gear got snagged.
The tension produced by the cables was sinking the stern and pushing the vessel towards the location where the gear had gotten snagged.
Hypothesis no.1
The machines were operating in manual mode without any crewmember being present.
Hypothesis no.2
The tension control system was engaged and a failure prevented them from being disconnected.
05/12/2008 07:15 to 07:45
None of the crewmembers was controlling the operation of the machines.
Lack of control over the cable tension in case of an accident.
Bad performance on the part of the crew.
05/12/2008 07:15 to 07:45
The remote control system for the machines was not used.
The only way to stop the machines was to access them.
Hypothesis no.1
Since the manual controls located next to the machines were engaged, and one was not able to access them, the machine's controls located at the wheelhouse could not be used.
Hypothesis no.2
The constant tension control system had malfunctioned and it could not be disengaged remotely.
05/12/2008 07:15 to 07:45
The doors used for accessing the trawling machines from the fish processing area were open.
This contributed to the flooding of the fish processing area.
Bad performance on the part of the crew.
2


Event
Effects and causes
2
05/12/2008 07:15 to 07:45
None of the crewmembers closed the doors that accessed the fishing machines from the fish processing area, or the door that accessed the fish processing area from the engine room.
This contributed to the progressive flooding of the vessel.
Neglect or improperly trained crew.
05/12/2008 07:15 to 07:45
The minimum break load of the cables was high enough for these not to break during the accident.
The cables did not break and continued sinking the stern.
The cables were calculated for trawling without taking safety into consideration in case of snagging of the gear.
05/12/2008 07:15 to 07:45
The vessel's stern was submerged, flooding the fish processing area and the engine room.
The vessel heeled towards her port side.
This eventually caused the vessel to sink.
This contributed to the progressive flooding of the vessel.
The doors used to access the fishing machines from the fishing area were left open.
The door for the ladder that communicated the fish processing area with the engine room was open.
The hatch used for accessing the fish processing area from the upper deck opened inward and it was held by a hydraulic locking system
The sea conditions, with waves between 6 and 7 meters high, caused the flooding rate to increase due to the impact of the waves and the vessel's pitching movement.
It pushed the vessel towards starboard and pulled on the cables, causing the vessel to heel towards her port side.
The waves were entering from the port side.
3


Event
Effects and causes
3
05/12/2008 07:45
The crew did not report the emergency situation, which was known when the 406 MHz radio beacon activated during the sinking.
Ran the risk of not having been rescued.
Bad performance on the part of the crew.
05/12/2008 07:45
We are only certain that five of the thirteen crewmembers were wearing their life vests, and one of them lost the vest when he jumped into the water because he was not wearing it properly.
Without the life vest, the possibility of dying was higher.
Improper training of the crew in the handling of emergencies.
05/12/2008 08:00
Information was received, stating that the vessel was anchored at Burela.
This had no effect.
Bad coordination on the part of the ship-owning company.
05/12/2008 09:04
From the time it was alerted, R/H PESCA II took one hour and nine minutes to take off.
The possibility of finding crewmembers alive decreased.
R/H HELIMER GALICIA was undergoing periodic maintenance.
R/H PESCA II was at the airport of A Coruña, which was not its home port, and only had one crew available.

* * *

Chapter 6. CONCLUSIONS

From everything that has been presented, this Commission has concluded the following:

- The day of the accident, F/V ROSAMAR departed from the port of Burela with thirteen crewmembers on board, and one of them was not included on the vessel's crew list.
- At the time of the accident, the vessel had been dispatched from Figueira Da Foz, Portugal, with all her documentation in order.
- F/V ROSAMAR's fishing gear got snagged when she was operating at a depth of 250 m.
- The trawling machines continued hoisting after the gear got snagged due to one of the following reasons:
  - — The trawling machines were operating in manual mode, without any of the crewmembers controlling them.
  - — The trawling machine's constant tension control was turned on and suffered a failure.
- None of the crewmembers attempted to operate the machine's controls, which are located at the wheelhouse.
- At the time of the accident, none of the crewmembers was controlling the trawling machines.
- The Skipper attempted to access the area where the trawling machines were located but was not able to, because the sinking of the stern and the sea surge prevented him from doing so.
- The tension of the machine's cables was such that the vessel's stern sank, resulting in the flooding of the fishing area. Three factors contributed to the flooding:
  - — The doors used to access the fishing machines from the fishing area were left open, which was a normal practice in this vessel.
  - — The sea surges acting on the stern and the waves coming in over the stern and the port side contributed to the flooding.
  - — The hatch used for accessing the fish handling room from the upper deck opened hydraulically towards the inside; in other words, towards the main deck. This way, the hydrostatic pressure of the water that accumulated on the upper deck when the stern sank caused the hatch to open and the fishing area to flood.
- The minimum break load of the cables was high enough for these not to break during the accident.
- The engine room flooded because the door for the stairs that communicated the fishing area with the engine room was left open.
- The crew did not ask for help, nor did they communicate the emergency, which was known when the 406 MHz radio beacon automatically activated during the sinking.
- Due to the flooding, the vessel's stern progressively sank, while the effect of the waves caused her to heel towards her port side.
- The crew was able to launch the starboard life raft into the water.
- We are only certain that five of the thirteen crewmembers were wearing their life vests, and one of them lost the vest when he jumped into the water because he was not wearing it properly.
- R/H PESCA II was transferred to the A Coruña airport in order to provide better coverage for the Galician coast because R/H HELIMER GALICIA was undergoing periodic maintenance. Since it was not operating out of its home base, R/H PESCA II only had one crew available and they were resting in a hotel near the airport at the time. This is why it took one hour and nine minutes from the time it was alerted, for the helicopter to take off.

* * *

Chapter 7. RECOMMENDATIONS

In order to prevent similar accidents and as a result of the assessment of the accident of F/V ROSAMAR on the 5th of December, 2008, the Standing Commission for Maritime Accidents and Incidents Plenary recommends the following:

- To fishing vessel designers:
  1. To design vessels so that the doors open outward, when opening towards interior spaces creates a flooding hazard in case of accident.
  2. To design remote shutdown systems for the fishing machines, effective under any circumstance.
- To crewmembers on board fishing vessels:
  3. To not add items to the systems installed on board vessels, or modify them, and always use them without compromising safety.
  4. To consider the vulnerability of vessels against possible floods and maintain all watertight doors closed because when these doors are left open, they may contribute to flooding.
  5. To Maritime Administrations:
  6. To carry out the studies required so that operating procedures in case of gear snagging on board fishing vessels can be drafted.
- To Maritime Administrations and SASEMAR:
  7. To create operating protocols that guarantee that a rescue helicopter crew is immediately availability at all times.
  8. To fishing vessel owners:
  9. To provide instructions to skippers and verify compliance with regulations and professional uses regarding the handling and maintenance of doors, regardless of whether or not they are watertight, as well as distress communications, the launching of life rafts, the correct use of personal protective equipment and the rest of on-board emergency procedures or abandon ship procedures, as well as the operation of the fishing machines.

* * *

Annex 1. ORGANIZATIONS THAT COMPRISE THE CIAIM

The organizations that comprise the CIAIM are the Plenary and the Secretariat.

The Plenary

The Plenary Commission is charged with validating the classification of accidents or incidents and approving reports and recommendations provided after a technical investigation has been conducted.

It is comprised of the following personnel:

- The President, appointed by the Minister of Public Works and Transport.
- The Vice President, a civil servant from the General Secretariat of the Minister of Public Works and Transport.
- A board member proposed by the Colegio de Oficiales de la Marina Mercante Española (Spanish Merchant Marine Officers Association), COMME.
- A board member proposed by the Colegio Oficial de Ingenieros Navales y Oceánicos (Official Naval and Oceanic Engineers Association),COIN.
- A board member proposed by the Asociación Española de Titulados Náutico-Pesqueros (Spanish Association of Nautical/Fishing Degree Holders), AETINAPE.
- A board member proposed by the Canal de Experiencias Hidrodinámicas de El Pardo (Public Hydrodynamic Centre for Model Tests), CEHIPAR.
- A board member proposed by the Centre for Public Works Studies and Experimentation, CEDEX.
- A board member proposed by the Secretaría General del Mar del Ministerio de Medio Ambiente y Medio Rural y Marino (Secretariat General of the Sea: Environment and Rural and Marine Affairs Ministry).
- A board member proposed by the Agencia Estatal de Meteorología (State Meteorological Service) AEMET.
- A board member proposed by the Autonomous Community where the accident has occurred.
- The Secretary appointed by the Minister of Public Works and Transport. Will participate in Plenary deliberations with a voice but without voting rights.

The Secretariat

The Secretariat falls under the Plenary Commission Secretary and carries out the investigation work as well as the reports that will be studied and approved afterwards by the Plenary.

The Secretariat is comprised of the following personnel:

- The Commission's Plenary Secretary.
- The investigation team comprised of Career civil servants belonging to the General Administration of the State.
- Administrative and technical personnel assigned to the Secretariat.

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