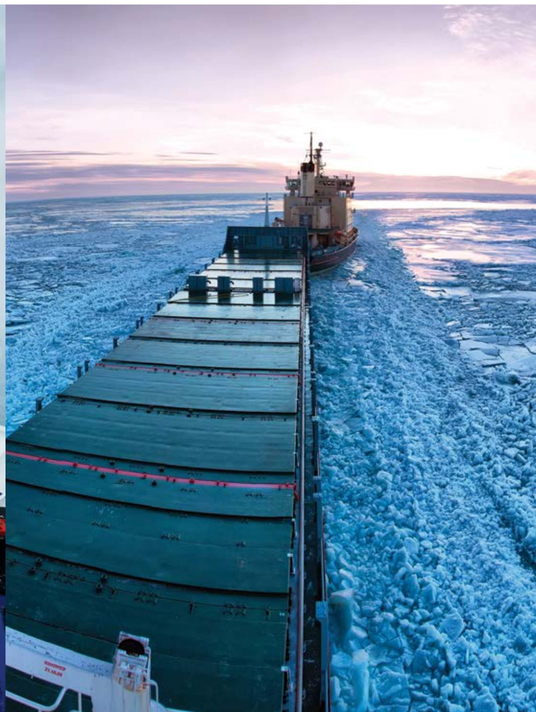
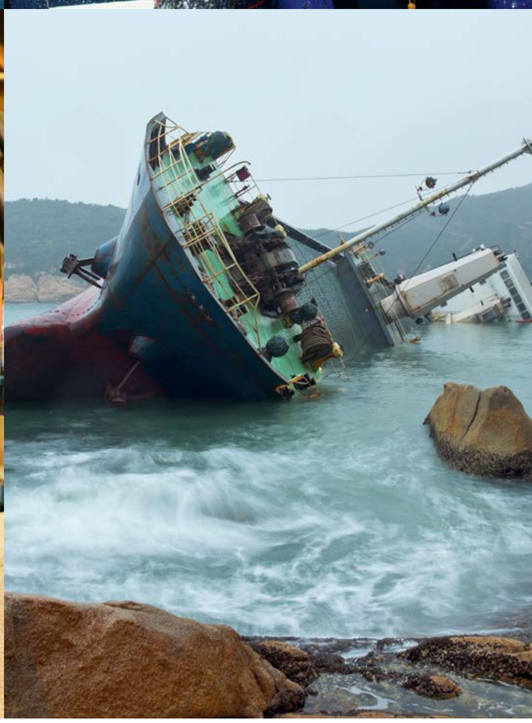
The Swedish Club

Claims at a Glance

Statistics updated January 2016








2016

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Executive summary

Protection & Indemnity (P&I) Claims

Main areas of concern

- Not cleaning and preparing the cargo room properly
- Poor maintenance
- Inherent vice* - cargo not in proper condition when loaded
- Not securing cargo according to the cargo manual
- Cargo manifest is not correct and does not include all IMDG (International Maritime Dangerous Goods) cargo
- Crew ignoring bilge alarms in cargo holds
- Not avoiding heavy weather and excessive speed in heavy weather
- Procedures not implemented correctly
- Equipment not secured for sea
- Not issuing or following work permits and risk assessments

Prevention

- Load as per the cargo securing manual and cargo plan
- Conduct a survey of the cargo condition throughout the entire loading operation and take samples
- Consult IMDG and IMSBC (International Maritime Solid Bulk Cargoes Code) for characteristics of commodities
- Weather routeing should be used to avoid heavy weather
- The crew should keep detailed records of the cargo on board
- Plans for loading/discharging to be made and followed in detail and documented
- Ensure there are no obstacles or debris on the deck or other working areas
- All officers should receive training on how to identify risks and ensure they understand how to use risk assessments

** Inherent vice: risk of deterioration of goods shipped as a result of their natural behaviour in the ordinary course of a voyage without the intervention of any random external accident or casualty.*

Hull & Machinery (H&M) Claims

Main areas of concern

- Insufficient planning and experience/training
- Non-compliance with the manager's procedures
- Procedures that are unclear, not comprehensive enough or not implemented correctly
- Not having experts attending major overhauls
- Not understanding limitations and how to properly use equipment and technology
- Poor lookout
- Lack of communication
- Not completing a correct passage plan

Prevention – Navigational claims

- Have a detailed navigation policy which includes descriptions and suggested settings for the bridge equipment
- Have multiple officers on the bridge during critical operations so one person's mistake can be detected and rectified
- Carry out a thorough audit of the navigation policy during the internal audit
- Implement MRM (Maritime Resource Management) training which focuses on proper communication
- Ensure communication is by closed loop communication

Prevention – Machinery

- Carry out on board fuel management and fuel system audits where the various parts (including separators) of the fuel treatment plant should be checked for proper functions
- Monitor the quality of the lubrication oil and ensure that samples of lubrication oils are sent ashore for analysis at least every three months, with a complete lube oil charge spare retained on board
- During major overhauls it is highly recommended to have an expert in attendance

1 Introduction

Claims at a Glance is intended as a tool to reduce the frequency of incidents for both P&I and H&M claims. The publication uses statistics obtained by The Swedish Club over the last five years in combination with the experience gained from carrying out Interactive Root Cause Analysis (IRCA) on recent cases. IRCA is a powerful loss prevention tool, enabling members and ourselves to discover the true root cause of a casualty as opposed to simply addressing the immediate symptoms.

It is clear that the root causes as to why casualties occur are similar between different claim types. It is also obvious that the key to reducing the number of casualties is to establish a sustainable safety culture both onshore as well as on board. Equally important is to secure 'buy-in' from top management level through to crew level on the ships. Successful implementation of such a safety culture will lead to a reduction in the number of casualties.

This publication focuses on what The Swedish Club believes are the root causes of the majority of incidents and what can be done to address them. Of course in many cases there are several causes that contribute to a casualty and to that end it is not always easy to pinpoint the exact root cause. However, by highlighting areas that are often neglected, we believe we can assist shipowners and managers in identifying the areas that need to be focused on and taking the necessary action to prevent the situation reoccurring.

The Swedish Club provides members with a wide range of insurance cover, from Protection & Indemnity (P&I), Freight Demurrage & Defence (FD&D), Marine and Energy & Offshore insurance, to specialist insurance products. We are committed to work with our members to implement loss prevention initiatives and reduce the incidence of casualties.

1.1 Methodology

1.1.1 Statistical sources

This year's Claims at a Glance includes findings from the following publications from The Swedish Club, and utilises the latest updated statistics.

P&I Claims Analysis
Wet Damage to Cargo
Heavy Weather
Navigational Claims
Main Engine Damage
Ice – Advice for Trading in the Polar Regions

1.1.2 Interactive Root Cause Analysis (IRCA)

The purpose of IRCA is to find the 'true' cause of a casualty. This enables the Club to highlight problem areas and advise members to take action to prevent the accident recurring. The technique does not waste time addressing symptoms, but rather the cause. The purpose is not to apportion blame but to raise awareness of the reason why the casualty occurred.

Rather than one sharply defined methodology, IRCA comprises many different tools, processes, and philosophies. The Swedish Club uses the 'Five Whys' tool to support its analysis. This analytical tool has been widely used to find and identify one, or several, root causes to a problem. By asking "Why?" five times successively it is possible to move beyond symptoms and delve deep enough to understand the root cause(s). By the time the fourth or fifth 'Why?' is reached, it is likely that management practices will be highlighted. A 'Why?' can have several possibilities and each answer has to be investigated for likely root causes.

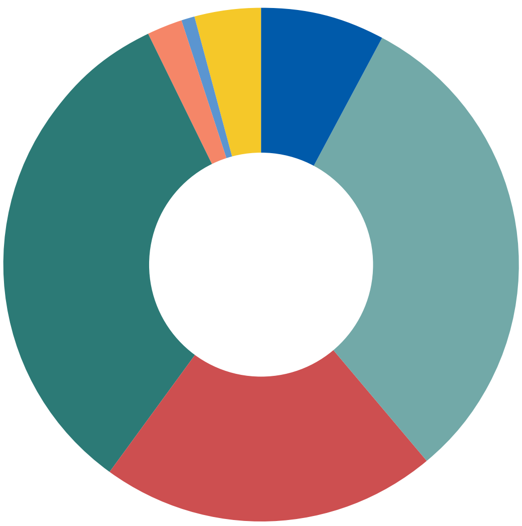
The 'Five Whys' tool does not provide an answer to the problem itself, but it is a useful tool for starting an analytical phase. The 'Five Whys' method relies heavily on experience, as it draws on the opinions and observations of the people performing the task.

1.2 Claims & vessel types

The Swedish Club closely monitors the frequency of different types of claim, prioritising identifying patterns and trends derived from its loss statistics for both P&I and H&M. The statistics are based on the three most commonly insured vessel types for P&I and H&M; bulk carrier, container and tanker vessels, which represent more than 75% of the vessels insured by the Club.

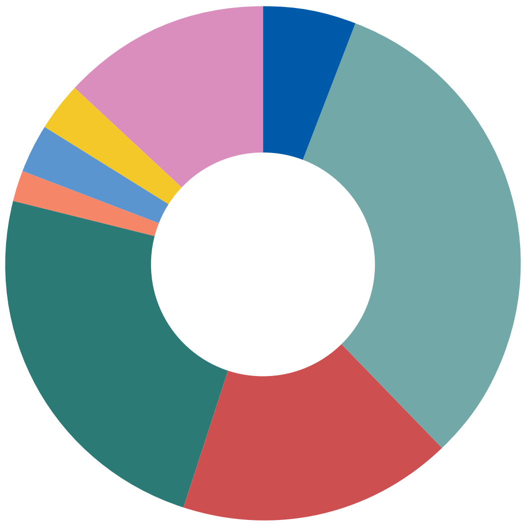
P&I claims include cargo claims, illness, and injury; and incurred costs in excess of USD 5,000 after deductible. Navigational claims under H&M include collision, contact and grounding; and incurred claims costs in excess of USD 10,000 after deductible.

Graph 1.1: **P&I** – all insured vessel types as per 1 January 2016



Dry Cargo	8%
Container	31%
Tanker	21%
Bulker	33%
Passenger/Ferry	2%
Miscellaneous	1%
Roro	4%

Graph 1.2: **H&M** – all insured vessel types as per 1 January 2016



Dry Cargo	6%
Container	32%
Tanker	17%
Bulker	24%
Passenger/Ferry	2%
Miscellaneous	3%
Roro	3%
Offshore	13%

2 P&I

2.1 P&I statistics

To make this study and analysis conclusive, the types of vessels were limited to; bulk carriers, container vessels and tankers, which represent 85% of the P&I fleet.

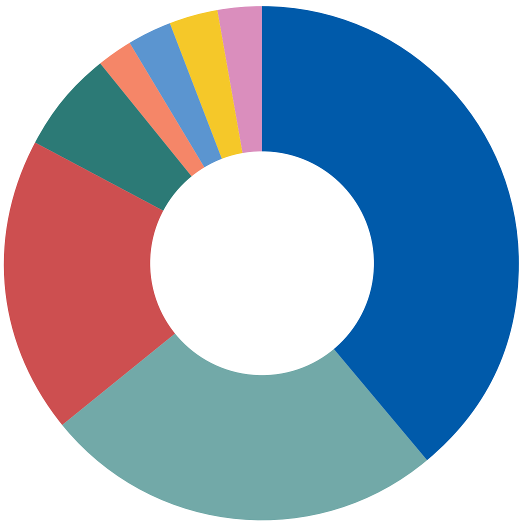
In addition the number of claim categories have been restricted in order to be representative of the Club's overall claims experience. The chosen claim categories are cargo, illness and injury.

For a more detailed report please refer to The Swedish Club's ***P&I Claims Analysis*** publication.

Graph 2.1: Claim distribution, frequency

Claims 5,000-3,000,000 (USD)

Period: 2011-2015
Vessel type: Bulk carrier, container & tanker
Types of claims: All claim categories
As per 29/12/2015

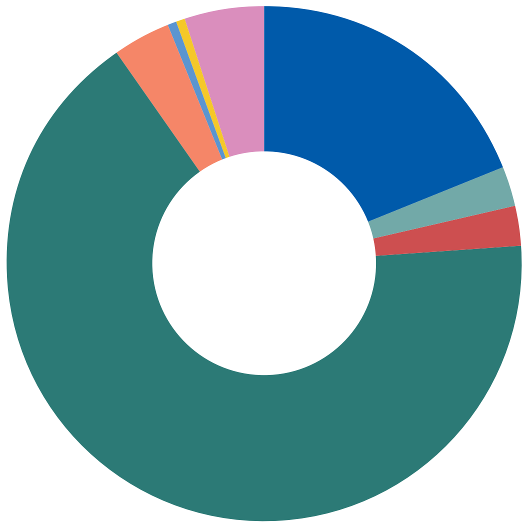


Cargo	39.11%
Illness	25.07%
Injury	18.69%
Other PI	6.53%
Collision	2.06%
Contact	2.75%
Stowaways	3.09%
Pollution	2.70%

Graph 2.2: Claims distribution, cost

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Vessel type: Bulk carrier, container & tanker
Types of claims: All claim categories
As per 25/12/2015

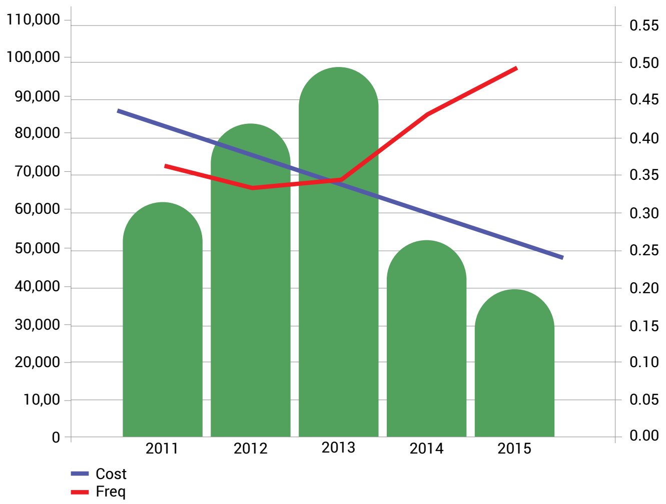


Cargo	19.00%
Illness	2.50%
Injury	2.60%
Other PI	66.40%
Collision	3.60%
Contact	0.60%
Stowaways	0.30%
Pollution	5.00%

Graph 2.3: Average claims costs & frequency (capped)

Claims 5,000–3,000,000 (USD)

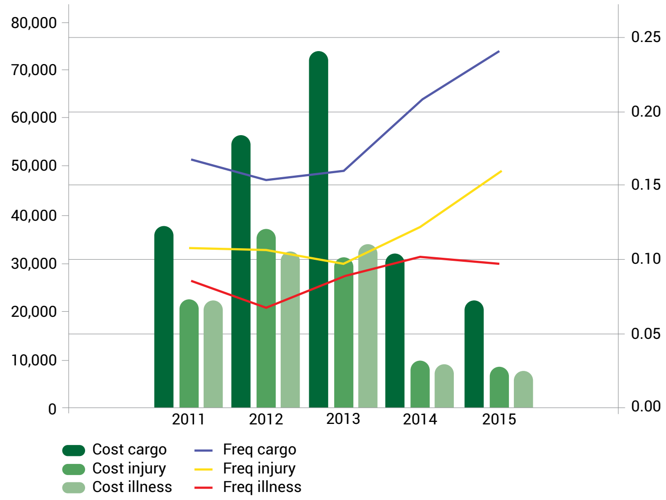
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Cargo, illness and injury
As per 29/12/2015



Graph 2.4: Average claim cost & frequency per category

Claims 5,000–3,000,000 (USD)

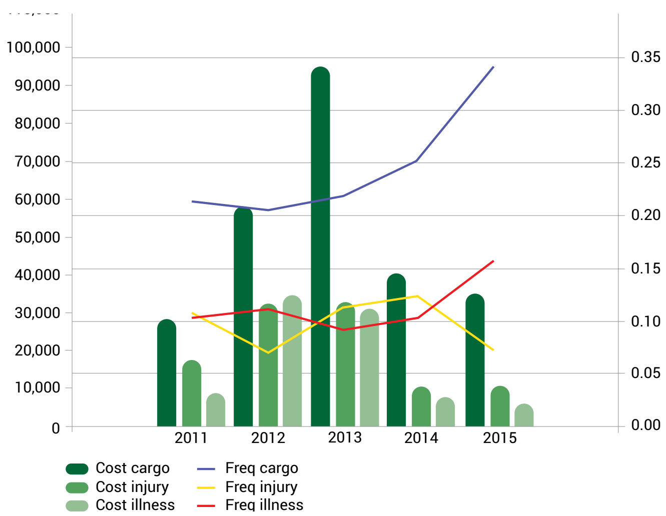
Period: 2011-2015
Types of vessel: **Bulk carrier, container and tanker**
Type of claims: Cargo, illness and injury
As per 29/12/2015



Graph 2.5: Average claim cost & frequency per category

Claims 5,000–3,000,000 (USD)

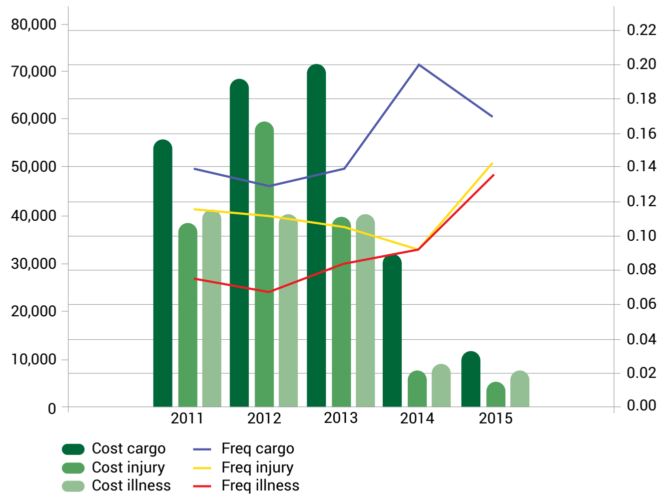
Period: 2011-2015
Types of vessel: **Bulk carrier**
Type of claims: Cargo, illness and injury
As per 29/12/2015



Graph 2.6: Average claim cost & frequency per category

Claims 5,000–3,000,000 (USD)

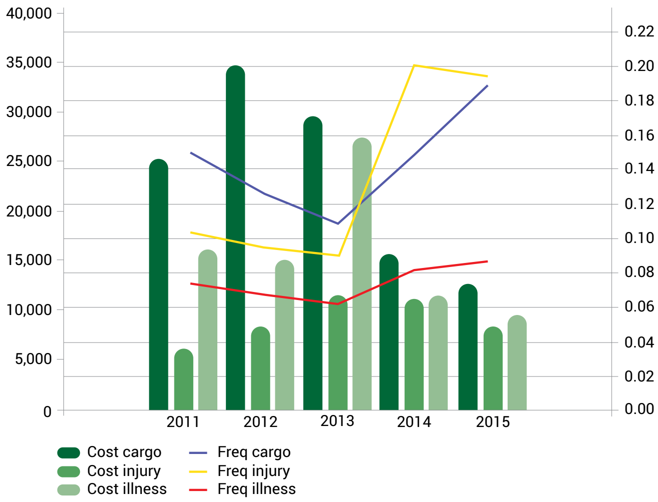
Period: 2011-2015
Types of vessel: **Container**
Type of claims: Cargo, illness and injury
As per 29/12/2015



Graph 2.7: Average claim cost & frequency per category

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: **Tanker**
Type of claims: Cargo, illness and injury
As per 29/12/2015



2.2 Cargo

Costly cargo claims are often due to catastrophic circumstances such as total losses, fires or navigational claims (which are categorised as collisions, contact or groundings).

The top three most expensive categories are inherent vice, collision and grounding. Inherent vice is caused because the cargo was not in a proper condition when it was loaded, emphasising the importance of having proper testing procedures to ensure that cargo is within specification.

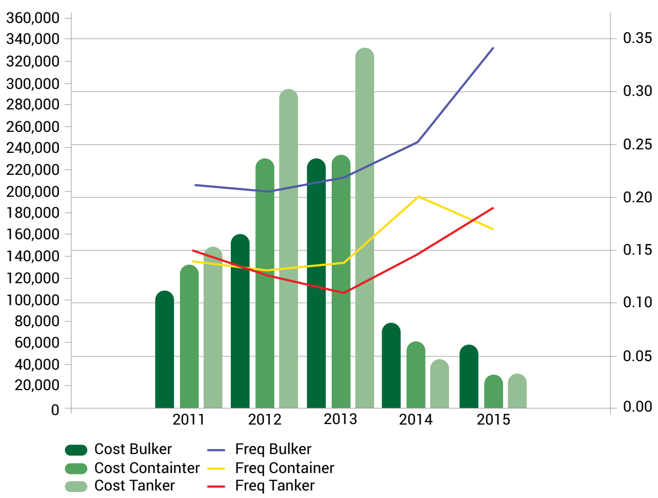
Cargo claims caused by collisions and groundings show how catastrophic claims have a rippling effect.

Apart from catastrophic claims, the most expensive cargo claims are contamination, where the cargo was contaminated or not in a proper condition when loaded. These issues are usually categorised as inherent vice or water leaking through cargo hatches.

2.2.1 Cargo claim statistics

Graph 2.8: Average claim cost & frequency per vessel type Claims 5,000–3,000,000 (USD)

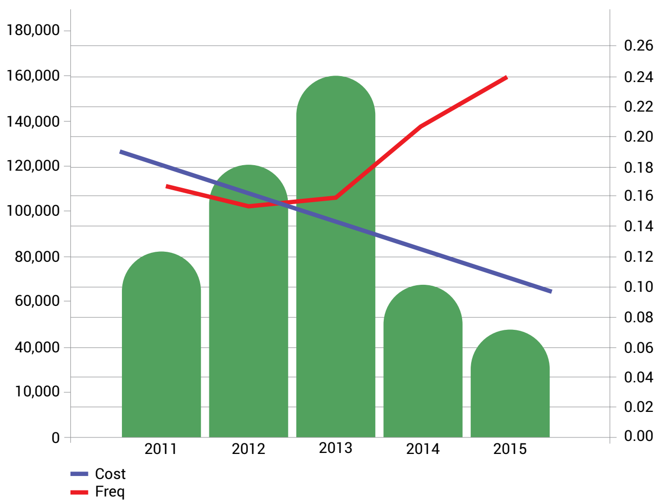
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Cargo
As per 29/12/2015



Graph 2.9: Average claim cost & frequency (capped)

Claims 5,000–3,000,000 (USD)

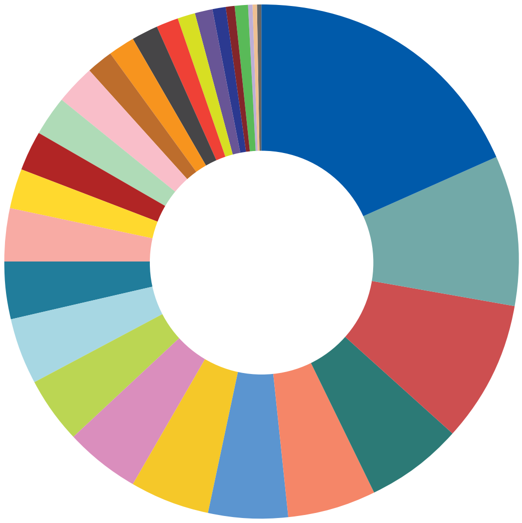
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Cargo
As per 29/12/2015



Graph 2.10: Immediate cause, frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claim: Cargo
As per 29/12/2015

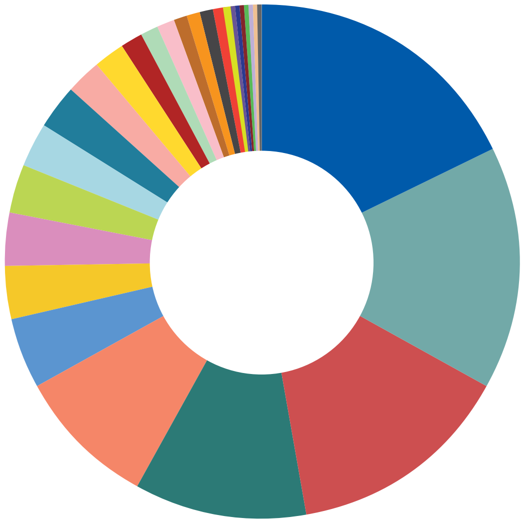


Improper cargo handling, shore-side	18.56%
Poor tally	8.23%
Improper cargo handling, ship-side	9.47%
Inherent vice	6.17%
Damage prior loading	6.04%
Multiple causes	5.90%
Leaking hatch covers	5.35%
Heavy weather	4.39%
Error in calculation	4.25%
Flooding of hold	3.29%
Insufficient cleaning	2.61%
Leaking container	2.61%
Damage post discharge	2.61%
Poor stowage	2.33%
Reefer mechanical failure	1.92%
Insufficient lashing/securing by shipper	1.92%
Insufficient lashing/securing by stevedore	1.92%
Collision	1.78%
Grounding	1.78%
Leaking vents	1.65%
Poor monitoring/maintenance of reefer unit	0.82%
Fire	0.82%
Leaking pipes	0.82%
Loading heavy containers on top of light	0.69%
Blocked bilges	0.55%
Leaking cargo	0.41%
Insufficient lashing/securing, ship-side	0.27%
Contact	0.27%

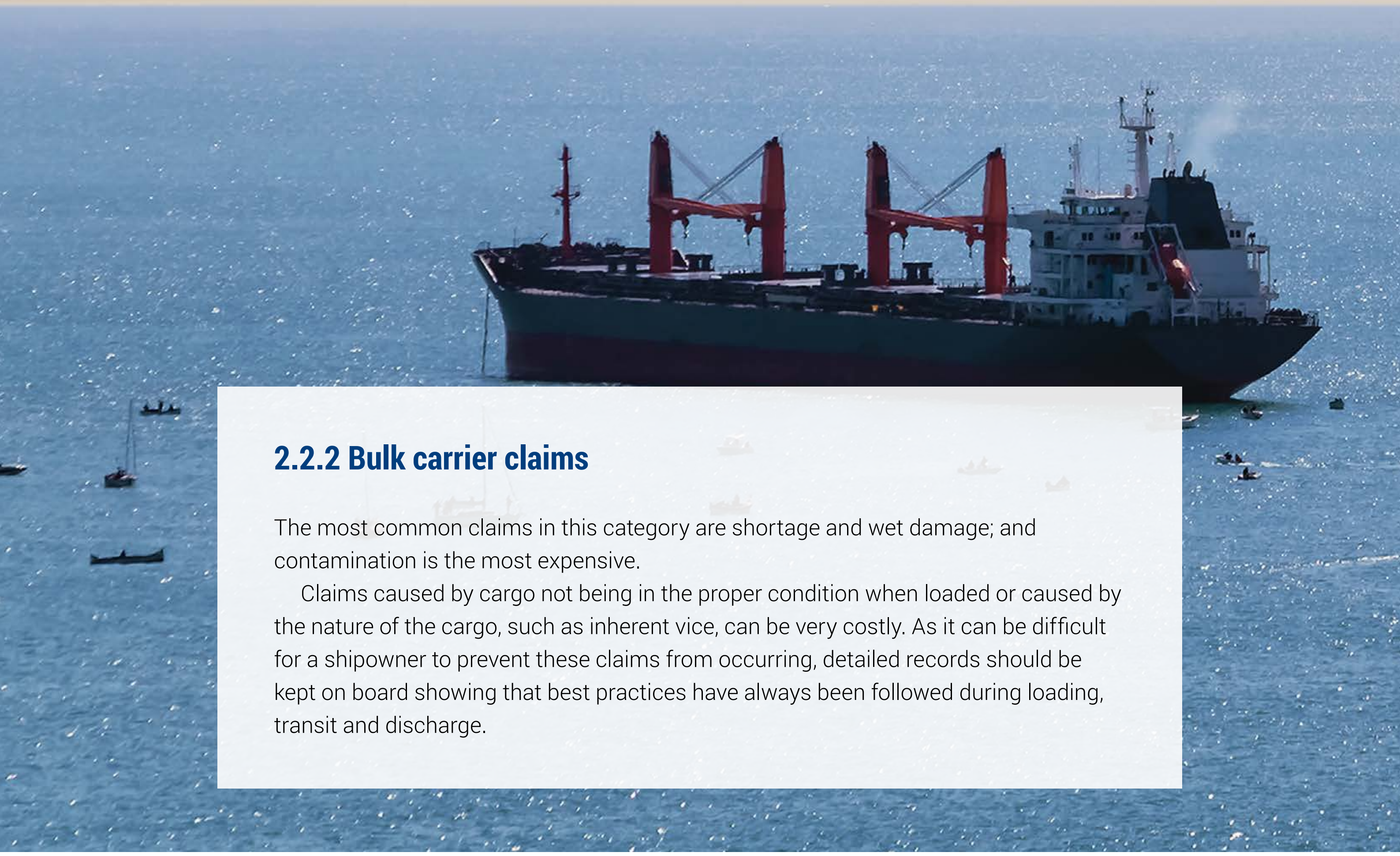
Graph 2.11: Immediate cause, cost per loss code

Claims 5,000–3,000,000 (USD)

Period: 2010-2014
Types of vessel: Bulk carrier, container and tanker
Type of claim: Cargo
As per 29/12/2015



Inherent vice	17.91%
Collision	15.36%
Grounding	14.22%
Fire	10.60%
Improper cargo handling, shore-side	9.00%
Leaking hatch covers	4.39%
Poor tally	3.34%
Flooding of hold	3.28%
Improper cargo handling, ship-side	3.27%
Multiple causes	2.67%
Insufficient cleaning	2.66%
Leaking vents	2.41%
Damage prior loading	1.93%
Damage post discharge	1.39%
Heavy weather	1.10%
Leaking pipes	1.04%
Poor stowage	0.90%
Reefer mechanical failure	0.90%
Error in calculation	0.81%
Leaking container	0.66%
Insufficient lashing/securing, ship-side	0.52%
Insufficient lashing/securing by shipper	0.38%
Leaking cargo	0.35%
Insufficient lashing/securing by stevedore	0.28%
Blocked bilges	0.26%
Loading heavy containers on top of light	0.22%
Poor monitoring/maintenance of reefer unit	0.13%
Contact	0.03%



2.2.2 Bulk carrier claims

The most common claims in this category are shortage and wet damage; and contamination is the most expensive.

Claims caused by cargo not being in the proper condition when loaded or caused by the nature of the cargo, such as inherent vice, can be very costly. As it can be difficult for a shipowner to prevent these claims from occurring, detailed records should be kept on board showing that best practices have always been followed during loading, transit and discharge.

Wet damage – mainly caused by:

- Improper cargo handling shipside
- Improper cargo handling shoreside
- Cargo wet when loaded
- Leaky cargo hatches

Shortage - mainly caused by:

- Improper cargo handling shipside
- Improper cargo handling and poor tally
- Loaded or unloaded cargo not properly calculated
- Incorrect cargo handling shipside or shoreside

Contamination – mainly caused by:

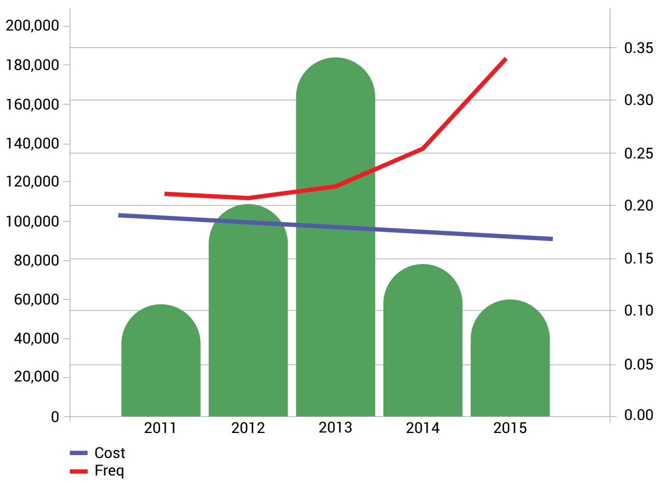
- Improper cargo handling shipside
- Improper cargo handling shoreside,
- Inefficient cleaning prior to loading
- Poor maintenance of cargo holds
- Mixing of incompatible cargoes
- Contaminated cargo or high moisture content prior to loading
- Inherent vice

2.2.2.1 Statistics – bulk carrier

Graph 2.12: Average claim cost & frequency (capped)

Claims 5,000–3,000,000 (USD)

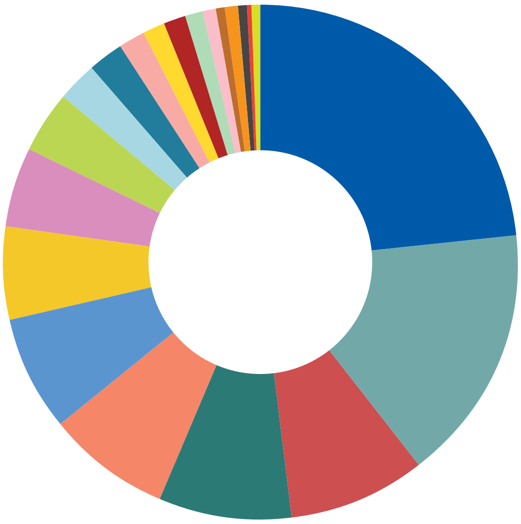
Period: 2011-2015
Types of vessel: Bulk carrier
Type of claims: Cargo
As per 29/12/2015



Graph 2.13: Immediate cause, frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier
Type of claim: Cargo
As per 29/12/2015

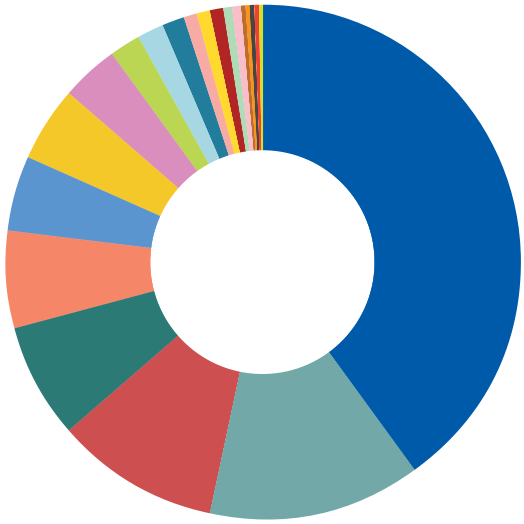


Improper cargo handling, shore-side	23.35%
Poor tally	16.34%
Improper cargo handling, ship-side	8.56%
Multiple causes	8.17%
Leaking hatch covers	7.78%
Inherent vice	7.39%
Error in calculation	5.84%
Damage prior loading	5.06%
Poor stowage	3.89%
Damage post discharge	2.33%
Insufficient lashing/securing by stevedore	2.33%
Heavy weather	1.56%
Grounding	1.56%
Blocked bilges	1.17%
Insufficient cleaning	1.17%
Leaking pipes	0.78%
Collision	0.78%
Leaking vents	0.78%
Fire	0.39%
Flooding of hold	0.39%
Insufficient lashing/securing by shipper	0.39%

Graph 2.14: Immediate cause, cost per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier
Type of claim: Cargo
As per 29/12/2015



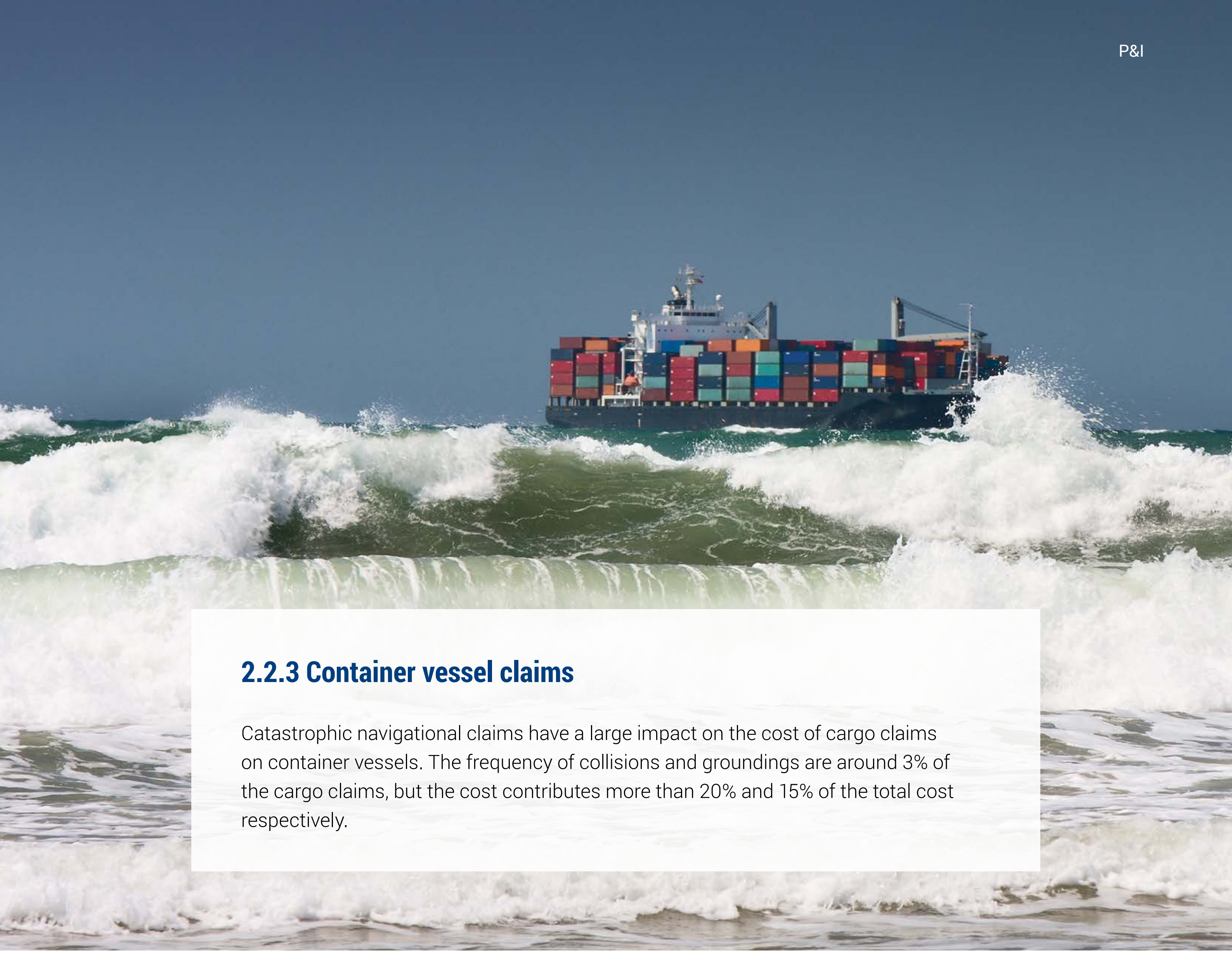
Inherent vice	40.00%
Grounding	13.52%
Improper cargo handling, shore-side	10.17%
Poor tally	7.18%
Leaking hatch covers	6.32%
Improper cargo handling, ship-side	4.86%
Multiple causes	4.59%
Heavy weather	3.77%
Error in calculation	1.75%
Leaking pipes	1.74%
Poor stowage	1.46%
Fire	0.92%
Damage prior loading	0.84%
Damage post discharge	0.81%
Blocked bilges	0.49%
Insufficient cleaning	0.44%
Insufficient lashing/securing by stevedore	0.42%
Leaking vents	0.36%
Flooding of hold	0.34%
Collision	0.17%
Insufficient lashing/securing by shipper	0.03%

2.2.2.2 Concerns - bulk carriers

- Leaky hatch covers (coamings/rubber seals)
- Heat damage
- Contamination (cargo hold cleaning)
- Shortage (common, depending on cargo and geography)
- Maintenance of sounding and vent pipes
- Liquefaction
- Inherent vice
- Flooding of cargo holds (manhole covers for ballast and bunker tanks not secured correctly after yard visit)

2.2.2.3 Prevention – bulk carriers

- Agree on a stowing plan.
- Stow in accordance with the IMSBC code.
- Ensure cargo holds are clean, dry and odourless before loading commences.
- Hatch covers and seals must be in a good and watertight condition.
- Ventilators and other means of entry into cargo holds should be in good operating order and capable of being closed.
- If any damaged cargo is loaded, always clause the bill of lading and mate's receipts accordingly.
- Conduct a survey of the cargo condition throughout the entire loading operation. Take samples.
- Have your own surveyor carry out a draught survey during loading and always insert 'weight and quantity unknown' in the bill of lading and mate's receipts, if not already stated.
- Conduct a draught survey at the discharge port before opening the hatch.
- Accurate and reliable tallying should be carried out when loading bagged goods.
- Refrain from loading during snow or rain.
- Install a proper bilge alarm in every cargo hold.
- Avoid loading wet cargo or loading in snow/rain as this can result in high humidity levels inside the holds. The clause 'wet before shipment' should be inserted on the bills of lading if such goods are loaded.
- Condensation must be considered when carrying certain cargo. Ventilate if the dew point in the air is lower than the dew point in the cargo space.
- Cargo classified as class A under the IMSBC code is capable of liquefaction. Before loading it is essential that the moisture content of the cargo is tested.
- The crew should keep detailed records on board to demonstrate;
  - Temperatures in cargo holds.
  - If the cargo holds have been ventilated and for how long.
  - Whether bunker tanks have been heated. This information is often missing when the surveyor tries to establish the cause of damage.
  - Temperature of all bunker tanks.
- If the vessel is carrying heat sensitive cargo this has to be considered when heating the bunker. Proper planning and bunker management is the best prevention.
- It is essential that all shut off valves, steam traps etc. for heating coils in fuel tanks are well maintained and fully operational. Records of maintenance and tests should be available in a vessels' PMS (Planned Maintenance System).
- Maintenance of temperature sensors in bunker tanks should be carried out periodically and always be fully operational and regularly tested. Records of maintenance and tests should be available in a vessel's PMS.
- The most common cause of fire in agricultural and general product cargo is the careless disposal of smokers' materials, often by stevedores who are notorious for both open and clandestine smoking, and problems with fumigants. The Master has some measure of control over the loading of bulk cargo and can take steps to prevent any fires.
- It is important that a pressure test is carried out following maintenance carried out on any pipes to identify potential leaks which can damage cargo.
- The PMS and SMS (Safety Management System) should include procedures ensuring that cargo lights are switched off after cargo operation, because of the substantial risk of overheating.



2.2.3 Container vessel claims

Catastrophic navigational claims have a large impact on the cost of cargo claims on container vessels. The frequency of collisions and groundings are around 3% of the cargo claims, but the cost contributes more than 20% and 15% of the total cost respectively.

Two of the most common container claims are physical damage and wet damage to the container cargo and these claims are usually caused by the following:

Physical damage – mainly caused by:
- Incorrect cargo handling shoreside
- Heavy weather

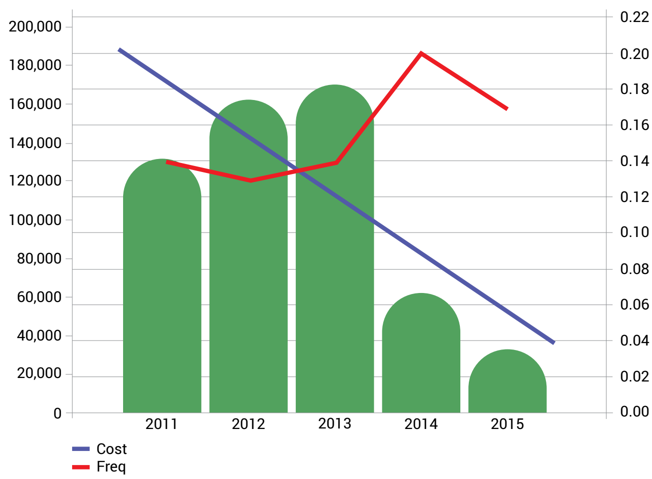
Wet damage – mainly caused by:
- Leaky cargo hatches
- Flooding of holds
- Pipes and valves in poor condition

2.2.3.1 Statistics – container vessels

Graph 2.15: Average claim cost & frequency (capped)

Claims 5,000–3,000,000 (USD)

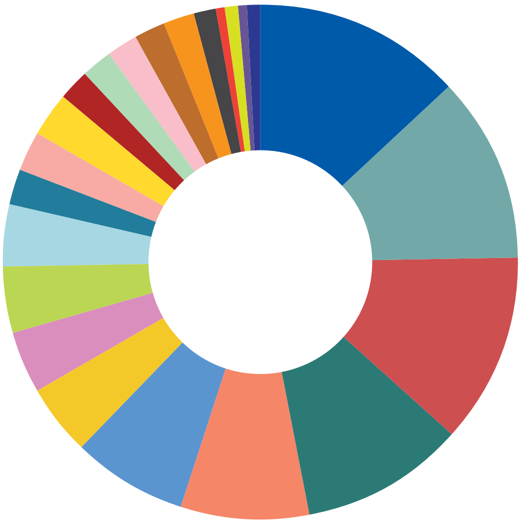
Period: 2011-2015
Types of vessel: Container
Type of claims: Cargo
As per 29/12/2015



Graph 2.16: Frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Container
Type of claim: Cargo
As per 29/12/2015

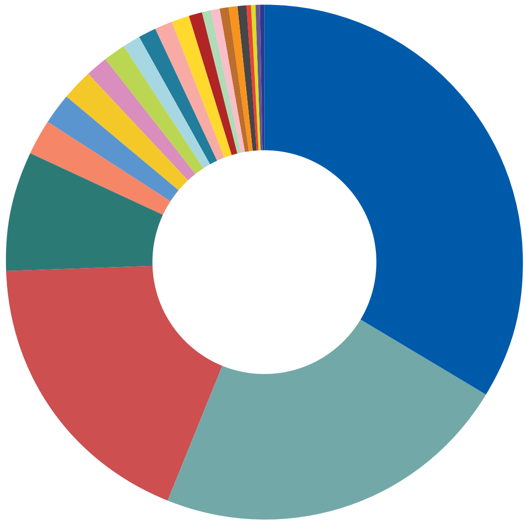


Flooding of hold	12.99%
Improper cargo handling, shore-side	11.69%
Heavy weather	11.69%
Leaking container	10.39%
Reefer mechanical failure	7.79%
Insufficient lashing/securing by shipper	7.14%
Inherent vice	4.55%
Improper cargo handling, ship-side	3.90%
Collision	3.90%
Poor monitoring/maintenance of reefer unit	3.90%
Leaking hatch covers	3.25%
Damage post discharge	2.60%
Loading heavy containers on top of light	2.60%
Poor stowage	1.95%
Insufficient lashing/securing by stevedore	1.95%
Grounding	1.95%
Multiple causes	1.95%
Fire	1.95%
Leaking pipes	1.30%
Leaking vents	0.65%
Insufficient lashing/securing, ship-side	0.65%
Damage prior loading	0.65%
Contact	0.65%

Graph 2.17: Cost per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Container
Type of claim: Cargo
As per 29/12/2015



Collision	33.80%
Fire	22.41%
Grounding	18.29%
Flooding of hold	7.67%
Leaking hatch covers	2.09%
Reefer mechanical failure	1.97%
Improper cargo handling, shore-side	1.97%
Leaking container	1.41%
Heavy weather	1.33%
Inherent vice	1.17%
Improper cargo handling, ship-side	1.15%
Insufficient lashing/securing by shipper	1.05%
Poor stowage	1.00%
Insufficient lashing/securing, ship-side	0.89%
Damage post discharge	0.64%
Multiple causes	0.58%
Loading heavy containers on top of light	0.54%
Fire	0.54%
Leaking pipes	0.47%
Leaking vents	0.45%
Insufficient lashing/securing, ship-side	0.33%
Damage prior loading	0.22%
Contact	0.03%

2.2.3.2 Concerns - container vessels

- Not securing containers according to the cargo manual.
- Charterers' loading plan differs from the vessel's cargo plan.
- Cargo manifest is not correct and does not include all IMDG cargo.
- Reefer containers poorly monitored during the voyage (even small changes in temperature can ruin cargo).
- Crew ignoring bilge alarms in cargo holds.
- Bilge alarms not maintained and tested properly.
- Not avoiding heavy weather.
- Excessive speed in heavy weather.

2.2.3.3 Prevention – container vessels

- Check and verify that the lashing methods follow the requirements as outlined in the vessel's cargo securing manual.
- The cargo securing manual should be applicable for the stowage arrangements and lashing equipment used, written in a language readily understood by the crew and other people employed for securing the cargo.
- Lashing equipment and securing points must be maintained regularly and inspected for wear.
- Make efforts to reduce the vessel's GM (metacentric height) when not fully laden.
- If possible, check that the container seals are intact and that serial numbers concur with numbers in cargo documents.
- Do not mix high cube containers with standard height containers in stacks as this does not allow bridging pieces to be fitted between stacks.
- Ensure that weights are declared and that maximum stack mass and height limits are not exceeded.
- Consult IMDG code for characteristics of commodities.
- Ensure crews investigate bilge alarms in the cargo holds as even a small amount of water can cause serious damage.
- Weather routeing should be used to avoid heavy weather.
- In heavy weather, adjust course and speed to ease the ship's motion.
- Have bilge alarms in all cargo holds, which both the bridge and engine room receive.
- Inspection of the bilges needs to be completed at least once per month as failure to do this runs a high risk of pumps and valves becoming damaged. Many accidents are the result of bilge pumps and sensors becoming heavily corroded.
- Make sure the lashings are as per the cargo securing material and if heavy weather cannot be avoided it is essential that crews do extra rounds and check that any non-standard cargo is properly secured.

2.2.4 Tanker claims

Contamination is a major issue for chemical and product tankers as it is both the most frequent and most costly type of claim.

Shortage – mainly caused by:
- Loaded or unloaded cargo not properly calculated
- Incorrect cargo handling shipside or shoreside

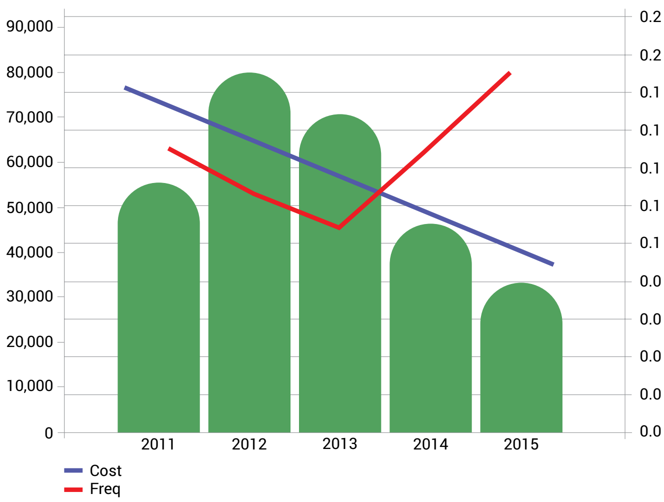
Contamination – mainly caused by:
- Insufficient tank cleaning
- Mixing of cargo
- Cargo contaminated prior to loading

2.2.4.1 Statistics – tankers

Graph 2.18: Average claim cost & frequency (capped)

Claims 5,000–3,000,000 (USD)

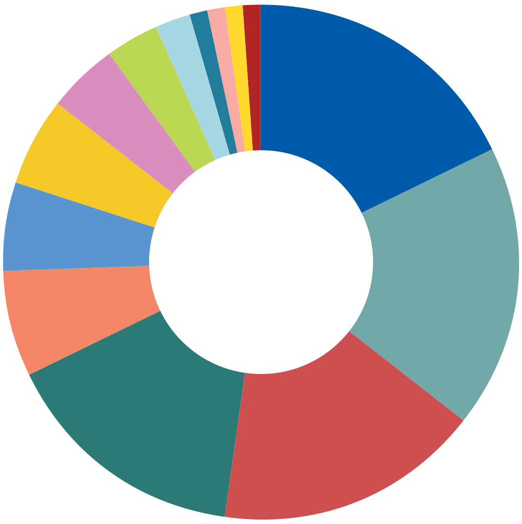
Period: 2011-2015
Types of vessel: Tanker
Type of claims: Cargo
As per 29/12/2015



Graph 2.19: Frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Tanker
Type of claim: Cargo
As per 29/12/2015

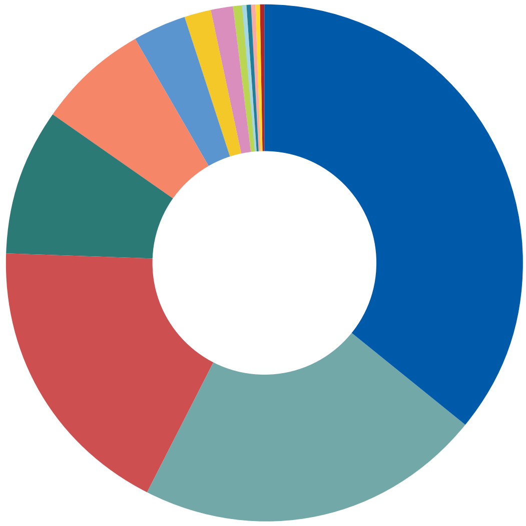


Insufficient cleaning	17.78%
Improper cargo handling, ship-side	17.78%
Improper cargo handling, shore-side	16.67%
Damage prior loading	15.56%
Error in calculation	6.67%
Inherent vice	5.56%
Poor tally	5.56%
Leaking vents	4.44%
Damage post discharge	3.33%
Leaking cargo	2.22%
Multiple	1.11%
Grounding	1.11%
Heavy weather	1.11%
Fire	1.11%

Graph 2.20: Cost per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Tanker
Type of claim: Cargo
As per 29/12/2015



Improper cargo handling, shore-side	35.80%
Leaking vents	21.83%
Insufficient cleaning	18.02%
Improper cargo handling, ship-side	9.17%
Damage prior loading	6.99%
Damage post discharge	3.22%
Inherent vice	1.66%
Poor tally	1.33%
Error in calculation	1.15%
Leaking cargo	0.30%
Fire	0.22%
Grounding	0.12%
Multiple	0.10%
Heavy weather	0.10%

2.2.4.2 Concerns - chemical/product tankers

- Gaskets on tank hatches in poor condition
- Incorrect cargo cleaning
- Failure to close valves after tank cleaning operations causing cargo contamination
- Improper draining of old cargo
- Improper loading plan addressing which valves and lines to be used
- Poor sampling procedures
- Not following charterers instructions
- Not maintaining required cargo temperatures
- Incorrect soundings

2.2.4.3 Prevention – chemical/product tankers

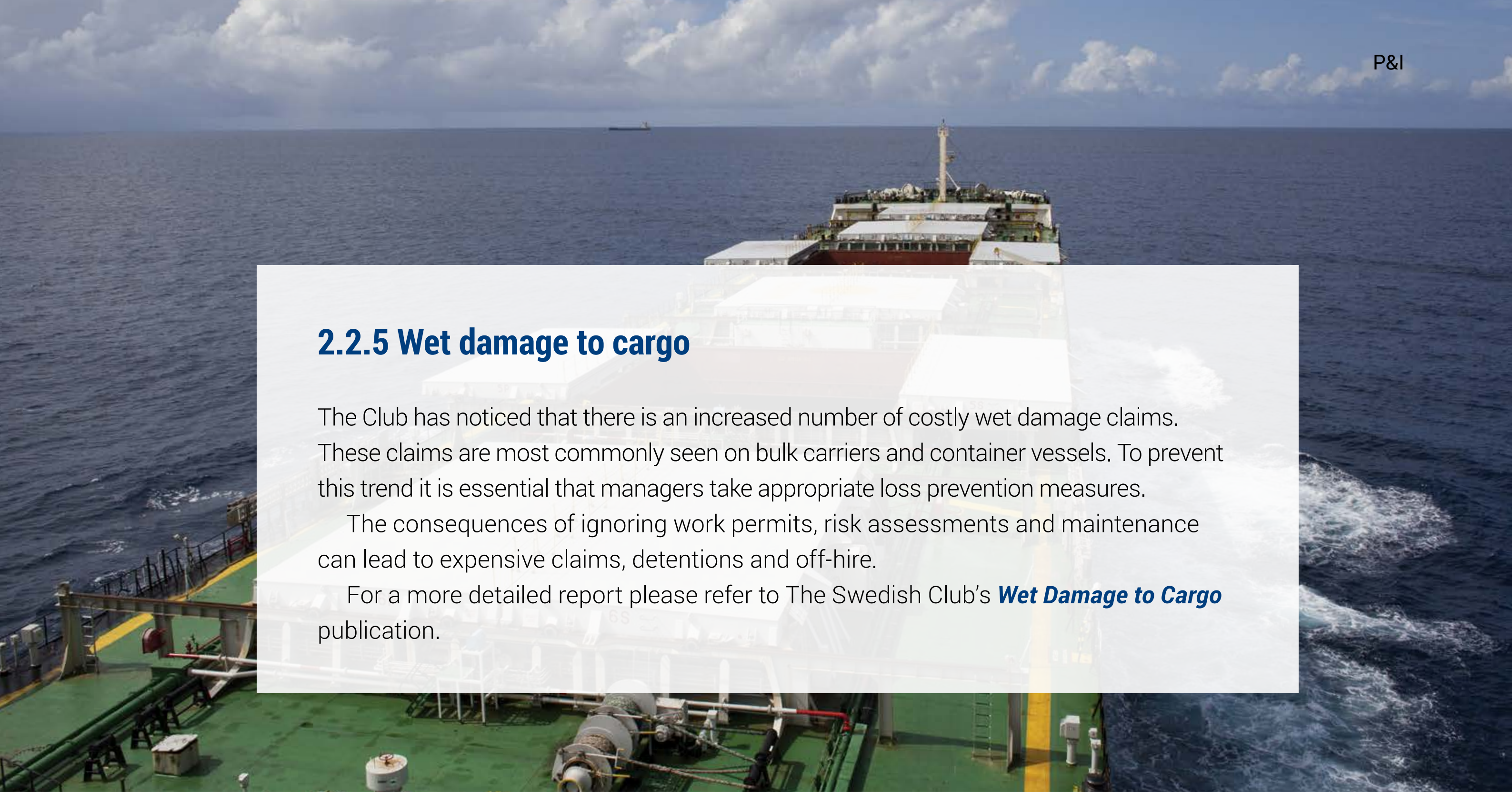
Cleaning
- Plan and document the different steps during the cleaning process and ensure charterer's instructions are followed.
- Clean
  - cargo tanks
  - cargo lines
  - drop lines
  - circulation lines
  - stripping lines
  - ventilation lines
  - vapour return lines.
- Drain all tanks and lines.
- Dry all tanks and lines.
- Before starting loading, ensure the tanks are clean and free from odour and remnants of previous cargoes.

Segregation
- Plan and document the lining-up of valves, blinds, etc.
- Inert lines and vapour return lines to be segregated as well, if applicable.
- Valves that should not be operated during loading/discharge to be locked.
- Install blinds to deck heat exchangers and heating coils if applicable.
- Blow heating coils and pump stack cofferdams
- Double check the complete line up before loading commences.

Cargo sampling
- Carry out:
  - Cargo sampling at manifold during commencement of loading each parcel
  - Cargo sampling of first foot loading at each cargo tank.
  - Cargo sampling from each tank when loading completed.
  - Cargo sampling from each tank before discharge commences.
  - Cargo sampling at manifold during discharge and loading of each parcel.
- All cargo sampling to be carried out together with the cargo interest surveyor.
- Maintain a proper sample log.

Loading/discharging
- Detailed plans for loading/discharging to be made and followed in detail and documented.
- Document all phases during operations including start/stop and reasons, max rates, pressure at manifolds etc.
- In the event of a discrepancy between the loading or discharging figures between the terminal and vessel, clause the bill of lading accordingly.

Transportation
- Follow charterer's instructions for circulation, inerting, temperatures and padding etc. and properly document all procedures.



2.2.5 Wet damage to cargo

The Club has noticed that there is an increased number of costly wet damage claims. These claims are most commonly seen on bulk carriers and container vessels. To prevent this trend it is essential that managers take appropriate loss prevention measures.

The consequences of ignoring work permits, risk assessments and maintenance can lead to expensive claims, detentions and off-hire.

For a more detailed report please refer to The Swedish Club's ***Wet Damage to Cargo*** publication.

Recurring issues

- Damaged valves and lines.
- Leaking cargo hatch covers.
- Coamings/rubber seals in poor condition.
- Leaking manhole covers.

Main areas of concern

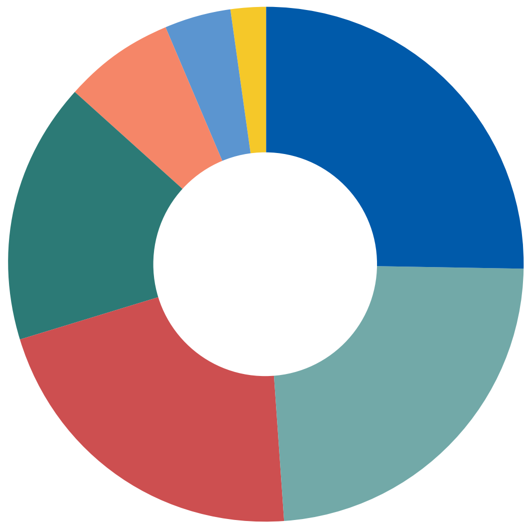
- Ignoring procedures such as risk assessment, work permits etc.
- Insufficient maintenance routines for valves and lines.
- Bilge alarms not maintained and tested properly.
- Crew ignoring bilge alarms.
- Location of the bilge alarm panel.
- Lack of due diligence and adequate checks.
- Insufficient experience.

2.2.5.1 Statistics - wet damage to cargo

Graph 2.21: Wet damage – frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
Type of claim: Cargo
As per 29/12/2015



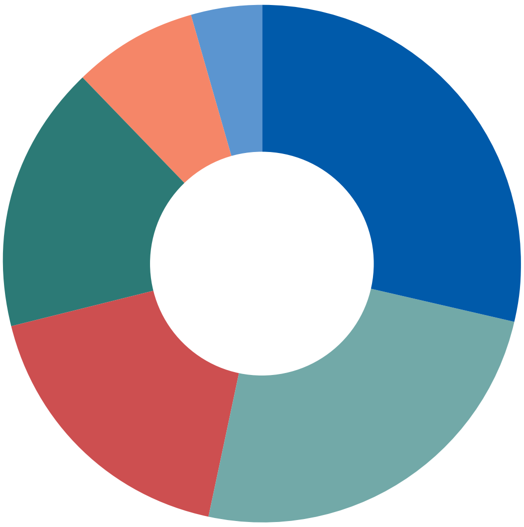
Leaking hatch covers	25.51%
Heavy weather	23.47%
Flooding of hold	21.42%
Leaking container	16.31%
Leaking vents	7.16%
Leaking pipes	4.09%
Leaking cargo	2.04%

Wet damage claims make up 19.56% of claims in total.

Graph 2.22: Wet damage – cost per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
Type of claim: Cargo
As per 29/12/2015



Leaking hatch covers	28.81%
Flooding of hold	24.73%
Heavy weather	17.58%
Leaking vents	16.78%
Leaking pipes	7.80%
Leaking container	4.30%

The cost for wet damage is 13.71% of the total claim cost, and the average claim cost is about USD 105,000.

2.2.5.2 – Prevention of wet damage to cargo

Specific areas of concern include:

Leaking manhole covers
Following a tank inspection it is not unusual for flooding to occur because the manhole did not have a gasket or the nuts or bolts were not tightened properly. There are also casualties, caused by the manhole being left open.

Preventive measures for leaking manhole covers
- All nuts and bolts should be in place and tightened evenly around the manhole cover
- Two people should check that it has been completed correctly when the job is finished
- It is important that the gasket for the manhole is clean and there is no debris or dirt causing leaks when the manhole cover is refitted
- The ventilators into the cargo holds should be in good operating order and capable of being closed

Damaged cargo bilge system
To prevent cargo holds flooding there must be established routines on board for testing bilge valves and bilge lines. Debris from the cargo is often pumped through the bilge lines, which causes damage to bilge valves or blockages. A visual inspection should be carried out to ensure there is no debris, or build-up of cargo around the bilge valves.

It is essential that bilges are cleaned and that bilge valves and lines are tested and inspected before loading commences. It is also prudent to test the bilge lines by pumping water through the system, but only if there is no cargo on board. Bilge valves should be included in the PMS and tested at regular intervals and it is important to verify that remotely operated bilge valves are in good condition.

Lack of maintenance on bilge valves and lines passing through cargo holds or adjacent compartments is a concern and so it is important that shipowners/managers have a plan for testing bilge valves and bilge lines.

There is also a risk that bilge valves can seize up if they are not operated. When the bilge pump has been stopped it is important that the non-return bilge valves are closed to prevent back flow.

There have also been casualties when a high level alarm has been acknowledged but without any investigation as to what caused the alarm. It is a concern if the bilge alarm panel is only on the bridge as many of these floodings happen during cargo operations when the bridge is usually unmanned.

Preventive measures for the bilge system

- Bilge wells should be cleaned and inspected regularly and the procedures documented
- Air and sounding pipes should be inspected for debris
- Valves and lines should be included in the PMS and tested at regular intervals
- It should be verified that remote control valves are operational
- Ensure all critical parts of the bilge system are included in the PMS
- Ensure all valves are closed when not in operation

Leaking cargo hatch covers and doors

Poor condition of cargo hatch covers is often due to poor maintenance. In the first instance the crew should ensure that the paint is intact, giving good protection against corrosion, and also should ensure that gaskets and coamings are in good condition.

A gasket can be expected to last for about four to five years. This short lifespan might be further shortened by over-compression and contact with abrasive materials. If the gasket is damaged the affected area should not only be repaired but the entire section will also need to be replaced.

Leaks can also be caused because the cargo hatches are battened down incorrectly. Before sailing it is essential that the crew ensures that all cargo hatches and other openings are secured properly, this is imperative if heavy weather is anticipated.

A prudent shipowner will instruct the crew to inspect the cargo hatches, gaskets and coamings during every loading and discharge. It is usually best to arrange complicated maintenance through the manufacturers, who can often offer professional service and provide the correct rubber and packing materials.

There have been numerous cases where compartments were filled with seawater because hatches or doors were not secured correctly. This can cause damage to electrical equipment within these compartments.

If a cargo hatch is secured too tightly this can also damage the seal, as if the gasket is too compressed it will be counterproductive. It is essential that the correct pressure is applied and that the cargo hatch is secured as per the manufacturer's instructions.

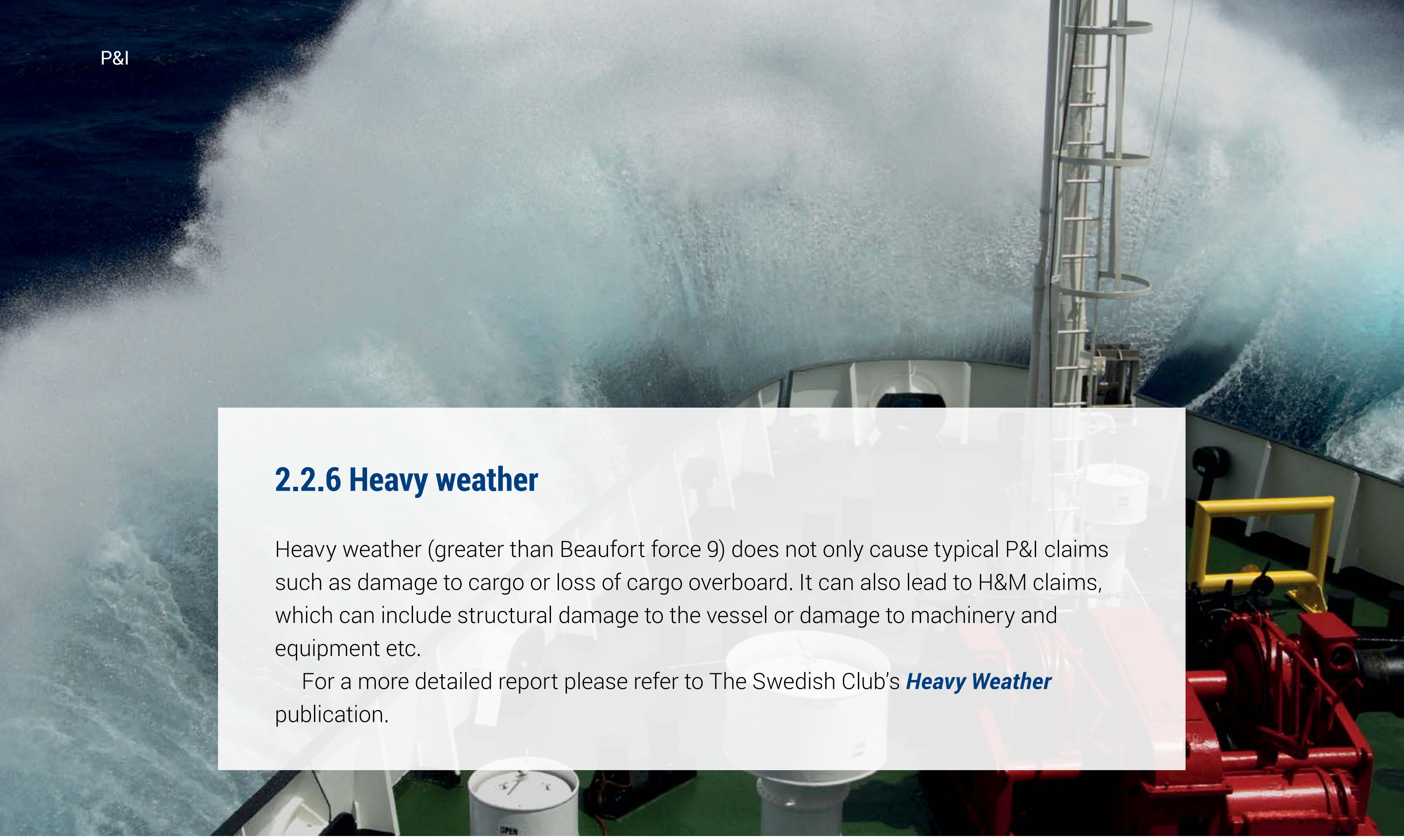
It is essential that cargo hatch covers are inspected and tested at regular intervals to ensure that the watertight integrity is maintained and that the vessel is in a cargo-worthy and seaworthy condition.

To verify the integrity of a cargo hatch there are three common methods: the water hose test, the chalk test and the ultrasonic test. The only one of these tests that is proven to ensure that the cargo hatches are in good condition is the ultrasonic test. The ultrasonic device designed for this purpose can pinpoint a leak and identify if compression of the gasket is sufficient. The advantages of using this type of equipment are evident, since ultrasonic tests can be carried out during any stage of the loading without risking cargo damage. The test can also be completed in sub-zero temperatures.

It is important that records are kept about what maintenance and service has been completed in the PMS. It is also important that the SMS addresses how maintenance is carried out and what areas need to be inspected and tested.

Preventive measures for cargo hatch cover issues

- Carry out regular ultrasonic tests on cargo hatches
- Ensure there are SMS procedures that address required jobs to maintain the cargo hatches in proper condition and include these tasks in the PMS
- Carry out risk assessments addressing the problems of leaking cargo hatch covers
- Ensure crews maintain an intact paint finish, which will give good protection against corrosion
- Verify that gaskets and coamings are in good condition
- Keep detailed records of completed maintenance, inspections and tests by both the crew and third parties



2.2.6 Heavy weather

Heavy weather (greater than Beaufort force 9) does not only cause typical P&I claims such as damage to cargo or loss of cargo overboard. It can also lead to H&M claims, which can include structural damage to the vessel or damage to machinery and equipment etc.

For a more detailed report please refer to The Swedish Club's ***Heavy Weather*** publication.

2.2.6.1 Concerns - heavy weather

Recurring issues

- Leaking hatch covers
- Lost containers
- Not avoiding heavy weather
- Excessive speed in heavy weather
- Incorrectly stowed containers
- Defective container structure
- Excessive transverse metacentric height (GM) values

Concerns

- Not using weather routeing
- Parametric rolling
- Insufficiently experienced crews
- Crew ignoring company procedures
- Cargo securing equipment in poor condition
- Non-standard securing equipment
- Incorrectly declared cargo

The most common reasons for heavy weather claims are that a vessel:

- Was unable to avoid the heavy weather
- Did not slow down
- Did not alter course to prevent large waves pounding the vessel

Wet damage is mainly attributed to leaking cargo hatches. There are a number of cases when the deck has been completely covered with water as the vessel did not slow down or alter course before big waves hit the vessel, covering the entire deck and hatches with seawater. If cargo hatches or other openings are not secured properly or in poor condition this will cause wet damage to the cargo.

The most common damage caused to cargo when encountering heavy weather is physical damage followed by wet damage and cargo lost overboard. This emphasises the importance of weather routeing, having a proper stowage plan and ensuring all cargo is properly secured before the voyage commences.

It is essential that all cargo is secured as per the cargo-securing manual, that the cargo computer is correctly calibrated, and that the cargo inside the container is correctly declared. We do acknowledge however that it is difficult for the owner to know exactly what is inside all containers on board and are concerned that the known problem with incorrectly declared containers proves very costly for the shipping industry.

2.2.6.2 Prevention – heavy weather

When preparing a vessel for sea it is essential that it is loaded as per the cargo securing manual, which provides guidance on securing devices and arrangements, stowage and securing of non-standardised cargo, plus stowage and securing of containers.

To avoid excessive acceleration and forces, course and speed may need to be adjusted for the vessel's motion in heavy seas. Early avoidance of heavy weather and adverse sea conditions is always recommended.

The best preventive measure any vessel can take against heavy weather damage is to slow down and to alter to a more favourable course.

Overall preventive measures

- Weather routeing should be used to avoid adverse weather.
- In heavy weather, adjust course and speed to ease the vessel's motion.
- Carry out a complete risk assessment for encountering heavy weather.
- Train and address heavy weather issues (stowage and ship handling) during seminars and in ship handling simulators.
- Distribute circular letters to vessels, ensuring that crews are aware of the problems associated with heavy weather.
- Implement checklists which ensure that cargoes are secured properly before sailing.
- Implement checklists which ensure that openings and hatches on deck are secured properly before sailing.
- Keep detailed records of maintenance, inspections and tests comvpleted both by the crew and third parties regarding hatch covers and other openings to compartments and cargo holds.

Specific prevention for bulk carriers

- Train and address heavy weather issues (stowage and ship handling) during seminars and in ship handling simulators.
- Hatch covers and seals must be in a good and watertight condition.
- Verify that gaskets and coamings are in good condition.
- Ventilators and other openings into cargo holds should be in good operating order and capable of being closed.
- Seal cargo hatches with Ram-Nek (a sealant tape).
- Carry out ultrasonic tests on cargo hatches.
- Ensure there are SMS procedures that address what jobs are required to maintain the cargo hatches in a proper condition and ensure these jobs are included in the PMS.
- Keep detailed records of maintenance, inspections and tests completed both by the crew and third parties regarding cargo hatch covers and other openings to compartments and cargo holds.
- Complete risk assessment for ensuring cargo hatch covers are weathertight.

Specific prevention for container vessels

- Check and verify that the lashing methods follow the requirements as outlined in the vessel's cargo securing manual.
- The cargo securing manual should be applicable for the stowage arrangements and lashing equipment used and written in a language readily understood by the crew and other people employed for securing the cargo.
- Lashing equipment and securing points must be maintained regularly and inspected for wear.
- Ensure procedures are in place for calibrating the loading computer.
- Try to reduce the vessel's GM when not fully laden.
- If possible, check that container seals are intact and that containers are secured correctly when the vessel is heading into heavy weather.
- Do not mix high cube containers with standard height containers in stacks. This does not allow bridging pieces to be fitted between stacks.
- Ensure that weights are declared and that maximum stack mass and height limits are not exceeded.
- Keep detailed records of maintenance, inspections and tests completed both by the crew and third parties regarding hatch covers and other openings to compartments and cargo holds.
- Be aware of the risks associated with parametric rolling.

2.2.7 Interactive Root Cause Analysis – Cargo Cases

The purpose of Interactive Root Cause Analysis (IRCA) is to find the “true” root cause of the casualty. If the root cause can be established and rectified the risk of the casualty reoccurring is substantially reduced.

IRCA: Leaking hatch covers

Synopsis

The vessel was loaded with wire coils. When loading was complete the crew taped across the transverse beams of all the cargo holds with Ram-Nek. During the vessel's transit it sailed through heavy weather that lasted for about two days. During this time the vessel was pitching and rolling and the cargo hatches were covered in water.

While discharging in port it was found that the steel coils in the top tiers were corroded. The steel coils below the centreline and folding seams were the most affected.

A surveyor in attendance observed that the cargo hatch covers were not in an adequate condition.
Most of the rusty coils were in holds 1 and 3. The surveyor tested the water integrity of the cargo hatch covers with an ultrasonic device, which detected significant defects to the sealing arrangements. The gaskets were in poor condition and the hatch covers tested positive for chloride, which indicates that saltwater had entered.

The non-return valves for the drain channel were also in a poor condition as they were clogged and the ball inside was not moving. The transverse packing on the hatch covers was leaking and there were some cracked corners and leaky side joints.

The surveyor also found a number of leaky ventilation covers.

WHAT? Corroded cargo of steel coils.

WHY? Steel coils were corroded because seawater had entered the cargo holds.

WHY? The cargo hatches were not weathertight.

WHY? Gaskets and cargo hatch covers were in poor condition.

WHY? Lack of maintenance.

WHY? The manager had not ensured there were proper procedures for maintaining the cargo hatch covers in good condition.

CONSEQUENCES
The cargo hatches were in a poor condition, which caused seawater to enter the cargo holds.

Preventative measures

- The vessel was repaired in a shipyard, which included renewing the damaged rubber gaskets. All cleats were repaired as were the support pads on the hatch coamings.
- Afterwards a hose test was carried out with satisfactory results. However it is strongly recommended that an ultrasonic test is carried out in preference to a hose test.
- According to the manager's procedures, all non-return valves for the coamings should have been inspected prior to every voyage. It could be seen that this had not been adhered to as the valves were in poor condition, which takes time to happen.
- The manager should improve maintenance routines. It is the responsibility of the Master to ensure the vessel is properly maintained to ensure the cargo is not damaged, but it is also the Superintendent's responsibility to ensure that required maintenance has been completed.
- The PMS should also be inspected during internal audits and it should be logged if specific jobs have not been completed.

IRCA: Flooding causing cargo damage

Synopsis

The crew was washing down the main deck. Both fire pumps in the engine room were running. The valves were closed to increase the water pressure to the anchor hawser. When washing down was completed all valves were closed, leaving the pumps in operation.

The vessel entered port the next day. During cargo operations the stevedores noticed water in cargo hold 1. The Master immediately sent the crew to investigate the other holds as well. It was noted that there was about 20cm of water in cargo hold 2.

The Master asked the chief engineer to locate the leak. The chief engineer discovered that the high-level bilge alarm had been activated repeatedly, but the duty engineer had only acknowledged the alarms without investigating the cause. The duty engineer had assumed that the alarms were triggered by rain.

The crew found that water was leaking from the fire lines (port and starboard side) to the void spaces adjacent to all cargo holds and then through openings in longitudinal bulkheads, to cargo hold 1 and 2.

The main fire lines extend from the engine room, through the void spaces to the forecastle. The void spaces are on the port and starboard sides of the vessel, below the main deck and adjacent to cargo holds 1, 2, 3 and 4.

The void spaces adjacent to holds 3 and 4 were watertight.

In case of any overflow from the void space adjacent to cargo holds 3 and 4, water would flood the main deck through air pipes. Water from the void spaces adjacent to holds 1 and 2 would flood the cargo holds through openings in the longitudinal bulkheads.

Preventive measures

- The manager should implement procedures for:
  - Properly operating the fire pumps
  - Regularly testing the main fire lines
  - Verifying the cause of bilge alarms
- The manager should create a risk assessment for how to properly complete a washing down

WHAT? Flooding of cargo hold, causing cargo damage to containers.

WHY? Water leaked from the main fire pipe flanges.

WHY? Because the gaskets between the pipe flanges were in poor condition.

WHY? Because the main fire line had not been regularly pressure tested and or maintained in proper condition.

WHY? The manager had not established any routines for testing the pipes.

WHY? The manager had not realised that this was an essential job.

CONSEQUENCES

The water pressure increased when the valves on the main fire line were closed. The rubber gaskets on the main fire line started to leak and filled the port side void space adjacent to hold 2 and the starboard side void space adjacent to hold 1. Once water reached the level of the lower edge of the openings in the longitudinal bulkheads, it started to flood the holds.

IRCA: Cargo damage caused by broken lashings

Synopsis

A general cargo vessel equipped with two cargo holds was planning to load in three different ports before the ocean passage. The vessel's Master requested dunnage and lashing material for the loading in the last port from the charterer. The request included 64 stoppers, 64 H-beams and 50 D-rings. Everything except the H-beams was delivered to the vessel.

The charterer had also arranged for a supercargo to be on board during the loading to make sure that the cargo securing was done properly. For reasons unknown the supercargo was present at all ports except the final loading port.

Cargo securing and lashing in all three ports was carried out by the crew. A lashing plan had not been drawn up by the charterers for any of the loading ports.

The charterer had arranged weather routeing for the ocean voyage. A few days into the voyage, the vessel encountered heavy weather in the Pacific Ocean with force 9 winds. The vessel was rolling and pitching heavily and the Master decided to reduce speed to half ahead and adjust the course to reduce rolling and pitching.

At that point the fire alarm was triggered in cargo hold 1, followed by an outpouring of dense smoke. The Master activated the cargo hold sprinkler system to prevent any eventual fire from spreading.

Two hours later the crew entered the cargo hold with breathing apparatus and wearing fire suits. No fire was detected but five layers of pipes had broken loose and shifted. After a few hours the crew were able to re-lash the pipes.

The heavy weather calmed down but three days later the weather deteriorated again with force 8 winds. Loud noises were heard from the cargo area. Once again some cargo had broken loose and was moving in the cargo hold, causing damage to the vessel's structure and adjacent cargo.

The crew entered the cargo hold again to try and secure the cargo. One 80m cargo unit had shifted causing damage to other cargo units and the vessel's structure. The crew were unable to secure the unit.

For the safety of the crew the Master decided to abandon the operation. The weather deteriorated so the Master deviated to the nearest port of refuge.

WHAT? Cargo came loose during heavy weather.

WHY? Cargo lashings broke.

WHY? The cargo had not been secured properly as sufficient cargo lashings were not used.

WHY? There was no proper cargo planning.

WHY? The manager did not have proper routines.

WHY? The manager had not identified this a critical operation.

CONSEQUENCES
Severe damage to cargo and structure.

Preventive measures

- The manager should ensure that proper cargo planning is carried out before loading commences
- The manager should ensure that the required lashing equipment is provided on board
- The manager should ensure that the cargo is secured according to the cargo plan
- If the cargo is not defined as per the cargo-securing manual proper calculations need to be completed
- The manager should review loading procedures
- The manager should ensure that the crew members concerned have the required skills and training to load and secure cargo

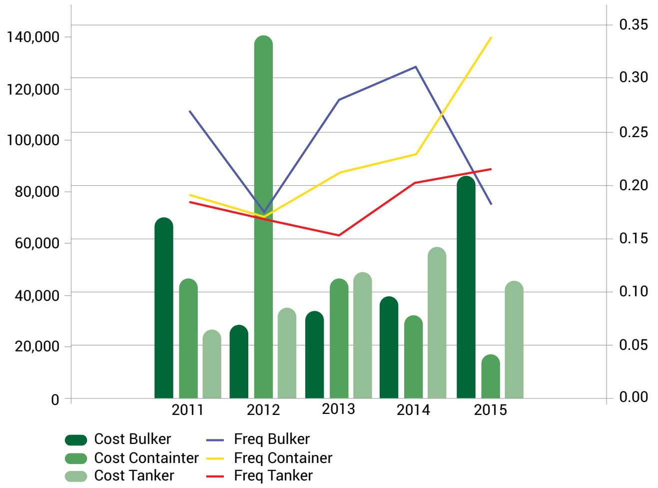
2.3 Injury

The frequency of injuries has increased substantially since 2012, which might be explained by a greater awareness of the right to make a claim and secondly the level of the potential financial compensation. There are, however, many other factors in operation. These include greater demands on individuals on board vessels, an increase in stress-related conditions and the erosion of social interaction in the lifestyle at sea.

2.3.1 Statistics – injury claims

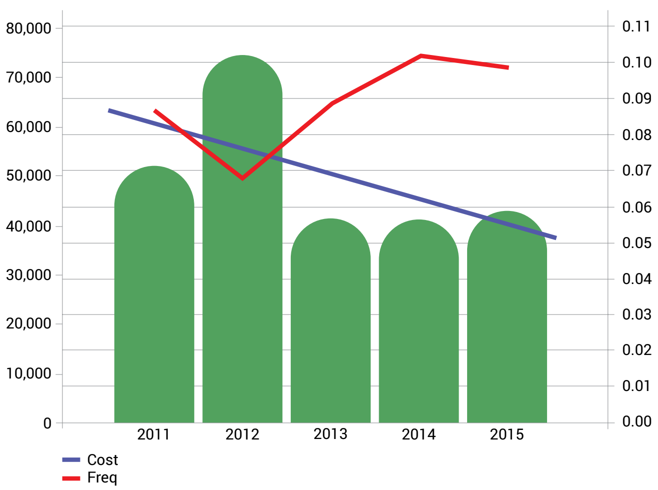
Graph 2.23: Average claim cost & frequency per vessel type Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Injury
As per 29/12/2015



Graph 2.24: Average claim cost & frequency (capped) Claims 5,000–3,000,000 (USD)

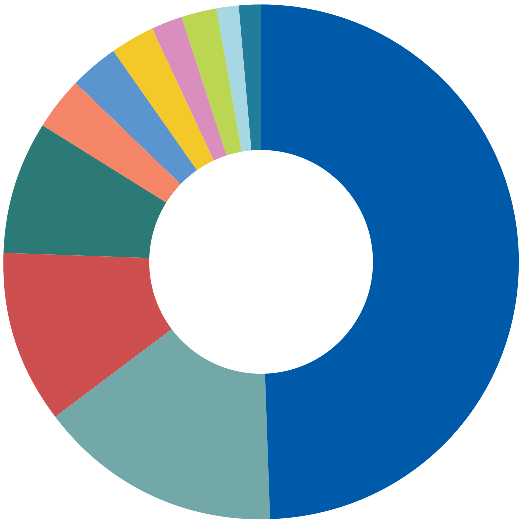
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Injury
As per 29/12/2015



Graph 2.25: Frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
Type of claim: Cargo
As per 29/12/2015

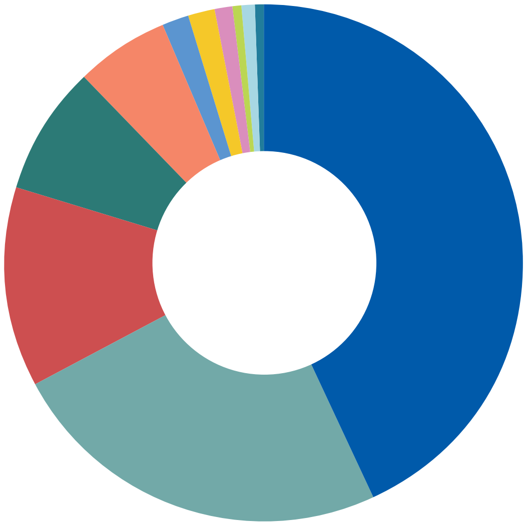


Slips and falls	48.17%
Struck by falling object	14.62%
Struck/caught by object(s)	10.63%
Caught in machinery or equipment	7.97%
Burns and explosions	6.31%
Strain by lifting	2.99%
Strain by pulling or pushing	2.66%
Strain by carrying	1.99%
Cut by object	1.99%
Power tool injury	1.33%
Chemical exposure	1.33%

Graph 2.26: Cost per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
Type of claim: Cargo
As per 29/12/2015



Slips and falls	43.18%
Burns and explosions	24.06%
Struck by falling object	12.52%
Struck/caught by object(s)	8.13%
Caught in machinery or equipment	5.95%
Strain by carrying	1.71%
Strain by lifting	1.47%
Strain by pulling or pushing	1.20%
Chemical exposure	0.64%
Cut by object	0.59%
Power tool injury	0.55%

2.3.2 Concerns – injury claims

Slips and falls are the biggest concern on all three types of vessel. Most injuries occur on the cargo deck area, machinery room and open deck areas and happen during normal maintenance, which usually requires a work permit and risk assessment. There are normally procedures in the SMS addressing these jobs and the biggest concern is that these procedures have been ignored.

Slips and falls – mainly caused by:

- Equipment on deck
- Poor lighting
- Catwalks and grating damaged during loading and unloading

Struck by falling object – mainly caused by:

- Equipment not secured for sea

Caught in machinery – mainly caused by:

- Not issuing or following work permits and risk assessments
- Taking short cuts

2.3.3 Prevention – injury claims

Many accidents can be prevented if vessels maintain good housekeeping and ensure that maintenance is carried out as required. These procedures will assist the officers in identifying hazardous areas before accidents happen. These suggestions should be implemented in the manager's ISM (International Safety Management Code).

- Create a checklist, which identifies potentially hazardous conditions, including a simple vessel diagram showing the main deck, cargo holds and other areas where stevedores are scheduled to work.
- Before arrival, the chief officer should inspect each hazardous area including (but not limited to) the condition of hatchways, latches, ladders, lighting, twist locks, wires, cables, cargo equipment, cranes, rusty conditions of deck etc.
- Stevedores should be informed about any planned or ongoing maintenance in the area they will be operating.
- The chief officer should take digital pictures of inspected spaces.
- The chief officer should present the stevedores with the checklist before cargo operation commences.
- If the vessel provides any equipment for the cargo operation e.g. twist locks, lashing chains, or hooks, this equipment should be regularly inspected, serviced, and replaced as necessary. Any inspection and maintenance should be recorded in the vessel's PMS.
- The Master should ensure that critical equipment like cranes is regularly inspected and working properly.

2.3.4 Interactive Root Cause Analysis - injury cases

IRCA: Injury when working aloft

Synopsis

It was morning and the bosun and three other ABs had planned to carry out maintenance work in cargo hold 1. The plan was to remove old Ram-Nek sealant tape and apply new. The bosun started to scrape on the tank-top. He was working in the aft starboard corner, scraping and replacing the Ram-Nek used to seal the space between the guide on the vessel's side and the movable bulkhead. The other ABs were working in the other corners. When the bosun finished on the tank-top he rigged a ladder to start scraping on the tank bulkhead.

At 10.00 the crew had a coffee break and when they finished the bosun planned to start working from the ladder.

He climbed up the ladder carrying a bosun's-chair, an extension, a roll of sealant and in his pocket a hand scraper. His plan was to scrape downwards and afterwards apply Ram-Nek. The bosun climbed the ladder while the other ABs had their backs to him.

All of sudden the deck gang heard a thud. They turned around and could see the bosun lying on his back on the tank-top, while the bosun's-chair and safety harness were lying by his legs. The inverted "U" which was the hook for the bosun's-chair was hanging from the ladder.

One of the ABs climbed out of the cargo hold and raised the alarm. The Master sounded the emergency alarm and mustered the emergency team by the hold.

The crew managed to secure the bosun on a stretcher and take him to the vessel's hospital. The bosun was bleeding from his head, ears, nose, had fractured his legs and right wrist. He was conscious but in great pain.

The vessel made contact with the Marine Rescue Coordination Centre and a helicopter was dispatched. The vessel was about 200 miles from land and it took the helicopter 4 hours to arrive.

WHAT? The bosun fell and fractured his legs and arm.

WHY? The hook on the bosun's chair broke.

WHY? There was nowhere to attach the safety harness and the hook to the bosun's-chair was non-compliant.

WHY? The crew thought it was acceptable to use a bent rebar as a hook, which is not compliant with the Code of Safe Practices for Merchant Mariners.

WHY? Nobody on board the vessel had noticed this risk and it was not identified during any internal audit.

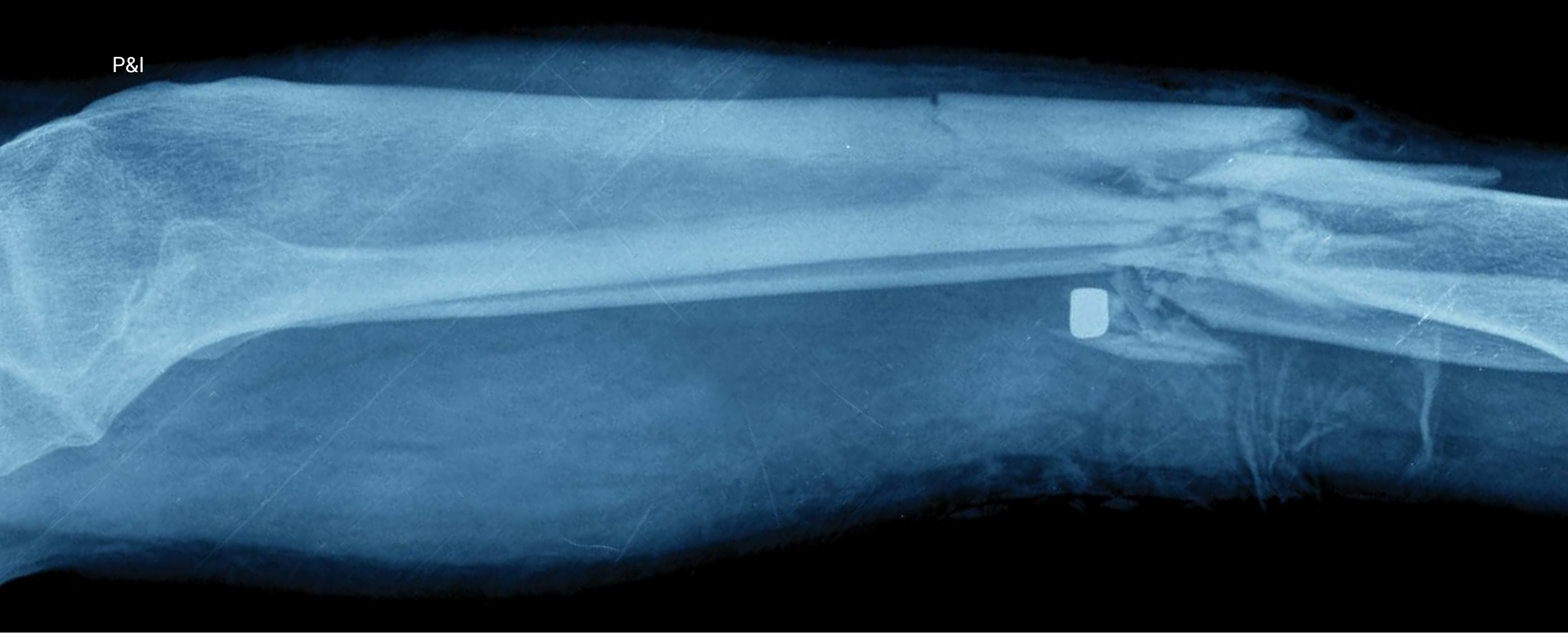
WHY? The manager had not been able to establish a culture on board that ensured the crew followed safety regulations.

CONSEQUENCES

During the following investigation it was found that the hook on the bosun's-chair had broken and that the bosun's safety harness was not secured. The chair hook was a U-shaped rebar, which is not a compliant hook as per the Code of Safe Practices for Merchant Mariners, section 15. A bent rebar will cause stress to the metal, which will finally cause it to break.

Prevention

- The chair hook was a U shaped rebar. A rebar should never be bent into a hook, as this will cause stress and latent fractures in the hook.
- The manager has now informed all vessels about this accident and to only use approved bosun's chairs and equipment.
- Crew on board vessels should be fined USD 20 for not wearing a safety harness.
- Even if the bosun had secured the safety harness to the ladder it's unlikely that this would have prevented the accident.
- It's important that if crew members are working aloft in a tank that they can secure the safety harness correctly.



IRCA - Fatal fall

Synopsis

An oil tanker was berthed alongside and discharging cargo. The chief officer was signing off from his shift for the day. His replacement had been sailing on the vessel for 8 years, since the vessel was built. The chief officers carried out a quick hand over.

The following morning the discharge operation was completed around noon. Cleaning the cargo tanks was to be done as soon as a surveyor from the terminal had confirmed that the tanks were empty. The surveyor was delayed and the Master contacted the terminal several times and asked for the surveyor. He stressed that, if the surveyor was not on his way, then he would order the tank cleaning process to start without him.

The Master had ordered a pilot for the next day at 06.00 and wanted to make sure that there was enough time to ventilate the tanks properly before departing the port. Therefore, he decided to start the tank cleaning before the surveyor had carried out his inspection. Cleaning the tanks was estimated to take four and a half hours and the Master assessed that at least six to eight hours ventilation was needed afterwards.

The chief officer was in charge of the tank cleaning operation and was responsible for giving orders to the 2nd officer in the control room and two ABs who were engaged in the tank cleaning on deck. One AB worked in the deck trunk, and the other AB was handling and monitoring the tank cleaning machinery on the tank deck. The chief officer's responsibility was to ensure that the tank cleaning was carried out safely and that the tanks were cleaned properly.

Initially, the tanks were flushed with seawater, and then cleaned full cycle with 50°C hot water and rinsed with fresh water. The chief officer visually checked that the tanks were clean. He checked each of the tanks by taking a couple of steps down the tank access ladder and looking down the tank while lighting it up with a torch. While doing so, the chief officer did not wear a fall arrest harness.

While the ABs and the 2nd officer were busy carrying out their own tasks, none of them noticed whether or not the chief officer measured the levels of oxygen and toxic gases in the tank atmosphere before he started visually checking them.

After a while the OOW in the cargo control room became aware that the chief officer was not answering the radio; so he sent one of the ABs to search for him. When the AB looked down into one of the tanks from the hatch opening he spotted the reflective striping on the chief officer's boiler suit at the bottom of the tank near the end of the ladder. The AB informed the 2nd officer that the chief officer was lying in the tank and that he was not moving. The 2nd officer went to the tank himself to confirm the AB's observation and then told the Master who was in his cabin.

The Master hurried to the tank and ordered the crew at the scene to fetch a stretcher, oxygen kit, and breathing apparatus. The Master put on the breathing apparatus and entered the tank. He found the chief officer severely injured and unconscious. The Master fastened a harness onto the chief officer, and the crew on deck hoisted him up. First aid was immediately given, and the 2nd officer contacted the terminal asking them to call the emergency coordination centre.

Meanwhile, the chief officer was fastened on a stretcher and hoisted over the side onto the quay by the ship's crane. The crew continued providing first aid ashore.

The ambulance arrived and its crew tried to resuscitate the chief officer. Ten minutes later he was pronounced dead at the scene.

WHAT? The chief officer fell from the top of the ladder into the tank.

WHY? He had not secured himself with a fall arrestor.

WHY? There was no requirement to secure a fall arrestor when entering a tank.

WHY? The risk assessment did not include this particular risk.

WHY? The manager failed to identify that falling from the top of the tank was a risk.

WHY? The manager had insufficient risk mapping procedures in place.

CONSEQUENCES

The chief officer was found about one metre away from the foot of the ladder and had fallen from a height of 10 metres. The heating coils at the bottom of the tank were significantly bent. This suggests that he struck the bottom of the tank with great force. It is most likely that he fell from the uppermost part of the ladder, tumbled down some of the ladder´s steps, and fell over the left side handrails.

One hour after the chief officer had been evacuated, the Master monitored the atmosphere in the tank. The gas monitor went up to its maximum 100pp of hydrogen sulphide content. It is not known if this made the chief officer unconscious.

The chief officer was not wearing a fall arrestor while climbing down the few steps of the ladder. It might have seemed unnecessary to him to connect a fall arrestor every time he stepped on a ladder, but the officer fell from the top of the ladder and died. Preventing every conceivable risk is impossible, but this risk on the other hand is very real. To prevent such an incident from happening it is important to have a system in place that makes it easy to secure a fall arrestor.

There are accidents every year where people fall into tanks while climbing ladders. This could be because they lose their balance or become unconscious due to toxic fumes in the tank. This demonstrates the importance of having a system that makes it easy to use a fall arrestor, which is very likely to stop a person falling to his death.

Preventive measures

- Initiate a Personal Safety Campaign in the company. This consists of a personal safety course, introduction of company lifesaving rules and a 'Take Five' personal planning tool. This campaign was launched in the company about a month later.
- Review and update SMS tank cleaning procedures and tank cleaning flowchart. This was completed in the company a month later.
- Review SMS and create guidance and procedure for when and how to check tanks and when opening hatches is allowed. This was completed in the company one month later.
- Review SMS regarding PPE and update procedures about measuring gas concentration. This was completed in the company one month later.
- Review SMS regarding PPE including requirement of harness and fall absorber during tank entry. This was completed in the company one month later.
- Install new hatches that are easier to open. This was completed in the company four months later.
- Increase the number of personal gas detectors required on board. This was completed in the company one month later.
- The company informed the charterers about the incident.
- The ladder at the time of the accident did not have any designated anchor points for the fall arrestor to be secured. This was rectified.
- It should be easy to connect a fall arrestor when entering a tank and it should be a requirement in the risk assessment.
- It should be a requirement to always have a fall arrestor secured when carrying out any job aloft.

2.4 Illness

Illness must be treated somewhat differently compared with injury and cargo claims, as most preventive measures need to be implemented before crew members board the vessel.

The manager can however prevent some problems by promoting healthier diets, ensuring there are exercise facilities on board, discouraging smoking and drinking, supporting crew members who wish to change their lifestyle, and by offering a PEME to their crew members before being employed.

There is also the ever-increasing problem in the industry of finding experienced, properly trained seafarers. Retention of quality personnel is a priority and it is important that these quality personnel are given the tools and the encouragement to make healthy choices.

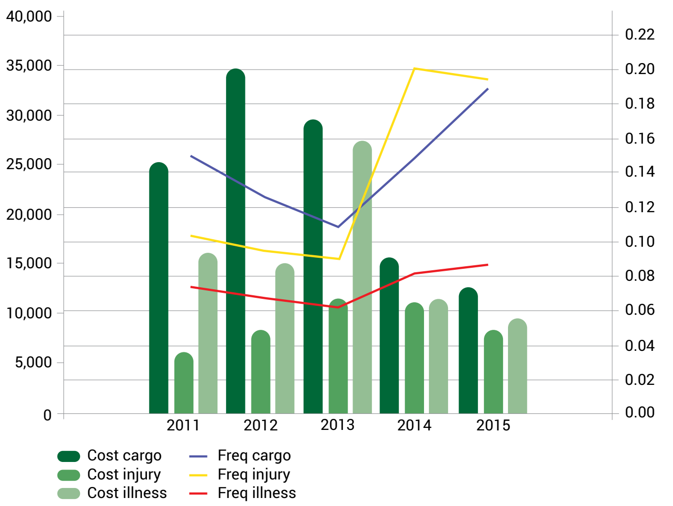
For managers, it is essential that they are sure that their crew members are fit and healthy before they are employed. A serious illness can cause so many other concerns besides the person's own illness. The vessel can be delayed in arriving at the next port, delayed in port, there can be problems finding replacement crew and the stress this will cause on board and ashore is difficult to measure in monetary terms.

2.4.1 Statistics – illness

Graph 2.7: Average claim cost & frequency per category

Claims 5,000–3,000,000 (USD)

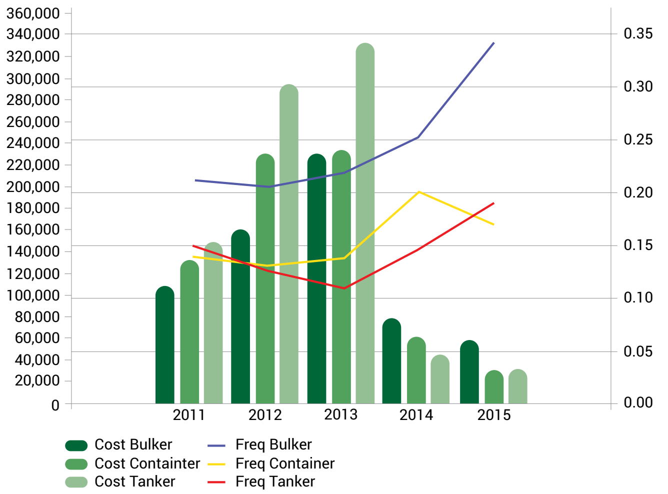
Period: 2011-2015
Types of vessel: Tanker
Type of claims: Cargo, illness and injury
As per 29/12/2015



Graph 2.8: Average claim cost & frequency per vessel type

Claims 5,000–3,000,000 (USD)

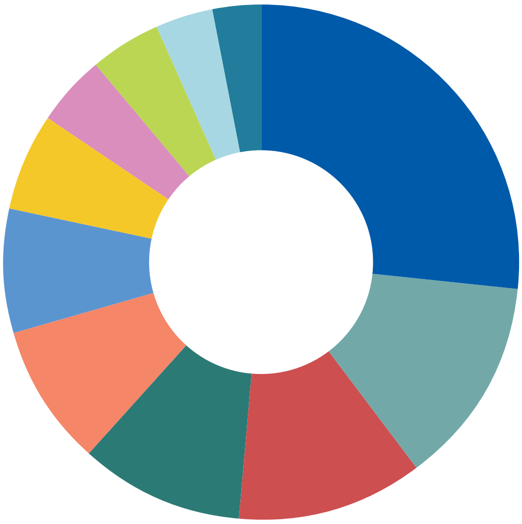
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Cargo
As per 29/12/2015



Graph 2.29: Frequency per loss code

Claims 5,000–3,000,000 (USD)

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
Type of claim: Cargo
As per 29/12/2015

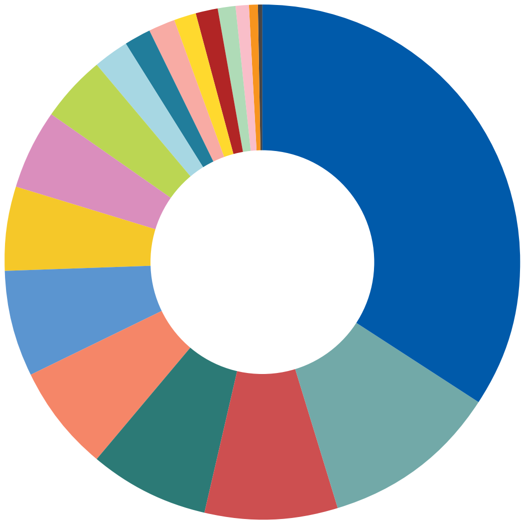


Conditions of the cardiovascular system	26.68%
Conditions of the genito-urinary system	13.21%
Conditions of the musculoskeletal system	11.59%
Infectious and parasitic diseases	10.24%
Conditions of the digestive system	8.89%
Appendicitis	8.09%
Conditions of the respiratory system	5.93%
Conditions of the skin	4.58%
Conditions of the nervous system	4.31%
Mental disorders	3.50%
Multiple causes	2.96%

Graph 2.30: Cost per loss code

Claims 5,000–3,000,000 (USD)

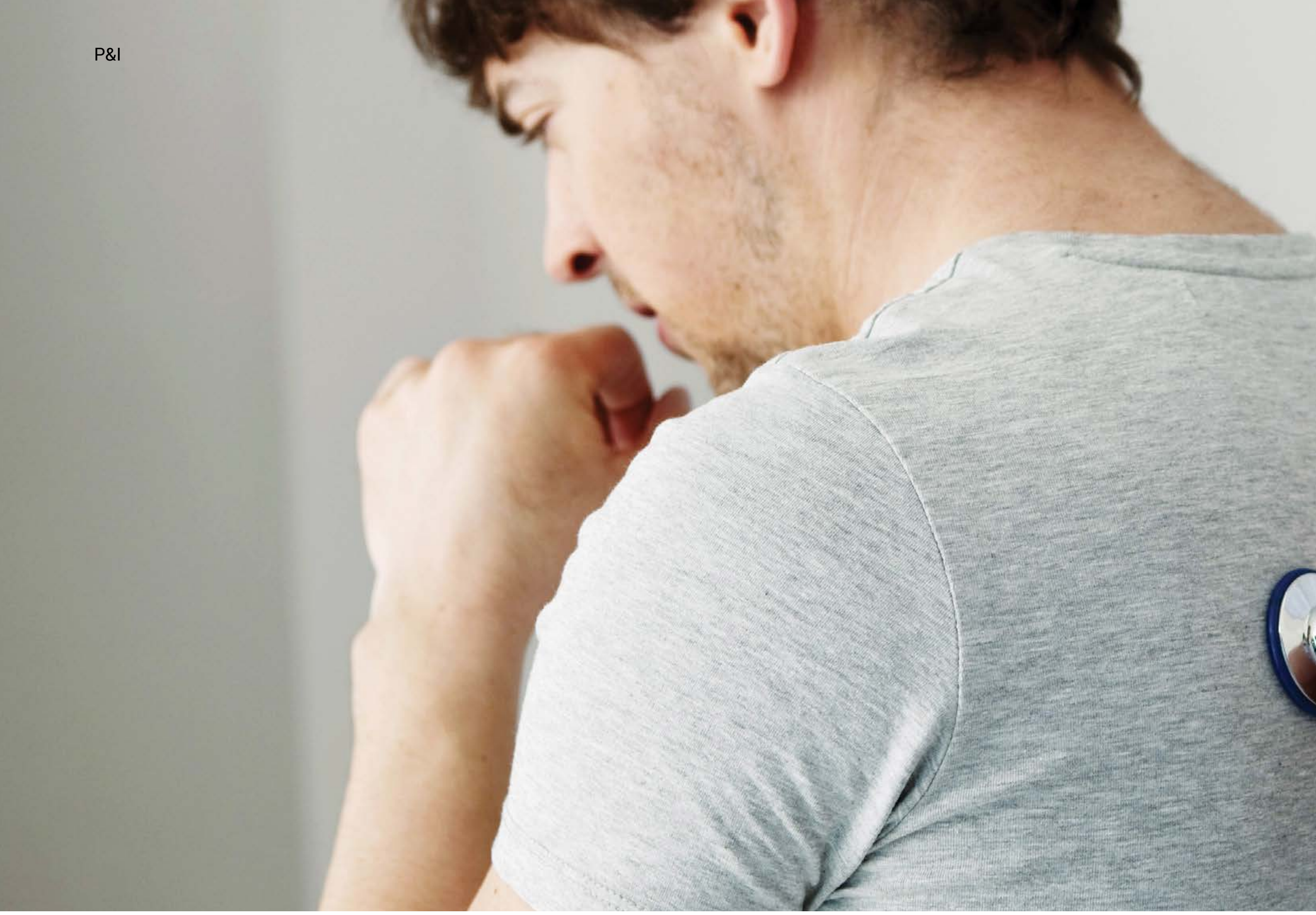
Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
Type of claim: Cargo
As per 29/12/2015



Conditions of the cardiovascular system	34.30%
Conditions of the nervous system	11.13%
Infectious and parasitic diseases	8.37%
Conditions of the genito-urinary system	7.36%
Conditions of the musculoskeletal system	6.65%
Conditions of the respiratory system	6.64%
Conditions of the digestive system	5.47%
Appendicitis	4.89%
Multiple causes	4.16%
Conditions of the skin	2.29%
Neoplasms	1.73%
Endocrine, nutritional, metabolic and immunity	1.56%
Eyes	1.40%
Diseases of the blood and blood-forming organs	1.37%
Mental disorders	1.30%
Ears	0.62%
Hernia	0.54%
Oral health	0.23%

2.4.2 Claims – illness

The most common cause of seafarer illness for all three types of vessels is cardiovascular disease, which is also the most costly. The crew cannot do a great deal once on board to prevent illness from happening apart from focussing on a healthy diet and exercise. It is very traumatising and complicated for the entire crew to deal with seriously ill crew members on board. The importance of ensuring that all crew members are healthy before joining the vessel is the best prevention, and for the company to support and actively try to encourage healthy living and exercise.



2.4.3 PEME (Pre Engagement Medical Examination)

The Club believes that the standard medical examination often proves an inadequate tool to prevent illness and ensure that a crew is fit and healthy. It can take years of unhealthy living for a serious illness to develop, and indeed the early symptoms of many illnesses are not initially obvious. If the warning signs can be identified and preventive measures taken at an early stage, it is likely that steps could be taken to prevent suffering and even premature death.

To this end, the Club has developed its own PEME, which is much more comprehensive than the normally required medical examination. Currently two clinics in the Philippines have been approved to carry out this examination on behalf of the Club. If the PEME is followed correctly a serious illness is more likely to be discovered.

The number of claims caused by illnesses, which could and should have been detected in thoroughly conducted PEMEs has increased substantially, both in number and cost.

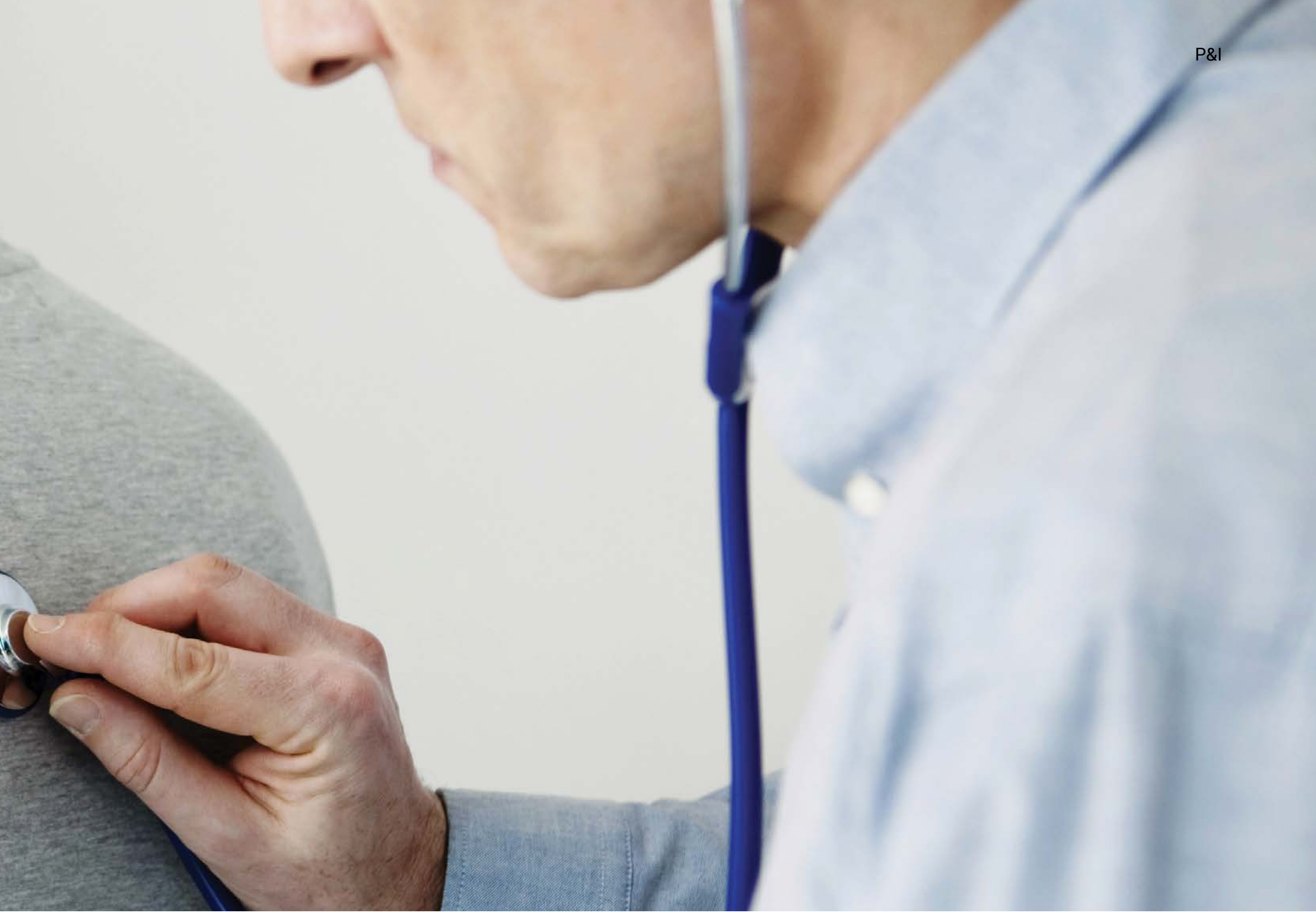
The best hope of reversing the increase in illness is to develop much wider recognition of the problem by the company's management, coupled with more emphasis on thorough PEMEs.

A PEME examination will result in the following benefits:

- The possibility of a more precise evaluation of the health status and cardiovascular risks.
- Reduction of the possibility of allowing unfit crew to go to sea.
- Overall healthier crew.
- Fewer deaths at sea as a result of cardiovascular disease, for example.
- Fewer helicopter evacuations, which are always a high risk.

It can prevent the following issues:

- Sudden disembarkation of crew on health grounds.
- Hospitalisation abroad.
- Difficult and risky repatriation.
- Death at sea.
- Loss of a qualified worker.
- Deviations, delays and general disruptions etc.



2.4.4 Prevention – illness

To prevent illness it is essential that the company has established preventive measures in place, before the crew member joins the vessel, and that they promote healthy living on their vessels. It is also very important to have comprehensive new hire procedures, to be able to ensure that the new crew member is healthy. It is unfortunate that the normal health certificate appears to be insufficient and that a more extensive health certificate is required. Of course there is also a need for procedures that ensure that all the crew in the company are healthy. The best prevention is to carry out a PEME.

Illness can strike at any time but by trying to identify problem areas and risks before they occur is good loss prevention practice and minimises the exposure in this respect.

3 H&M

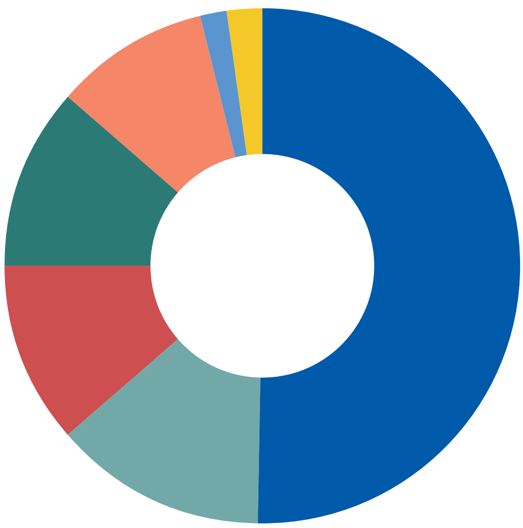
In this year's ***Claims at a Glance*** The Swedish Club has included some of the latest analyses carried out for Hull & Machinery claims carried out for the ***Navigational Claims*** and the ***Main Engine Damage*** publications.

3.1 H&M statistics

Graph 3.1: Claim distribution, frequency

Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
All categories H&M
As per 4/1/2016



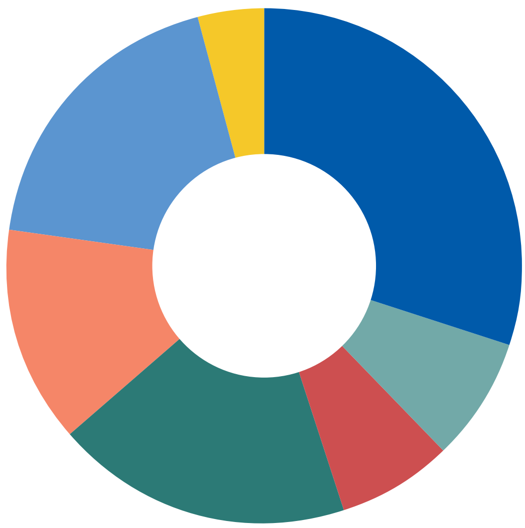
Machinery or equipment	50.35%
Contact	13.39%
Other HM	11.32%
Collision	11.47%
Grouding	9.70%
Fire or explosion	1.69%
Heavy weather	2.08%

Of all H&M claims, navigational claims (defined as collisions, contacts and groundings) represent approximately 35% of the total and machinery/equipment claims 50%.

Graph 3.2: Claim distribution, cost

Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container & tanker
All categories H&M
As per 4/1/2016



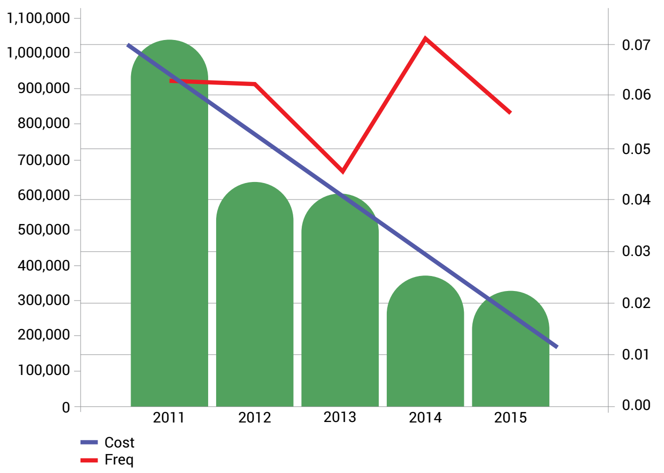
Machinery or equipment	30.20%
Contact	7.60%
Other HM	7.30%
Collision	18.60%
Grouding	13.50%
Fire or explosion	18.70%
Heavy weather	3.90%

The overall cost for machinery/equipment represents approx. 30% of the claims total and navigational claims, 40%.

Graph 3.3: Average claim cost & frequency (capped)

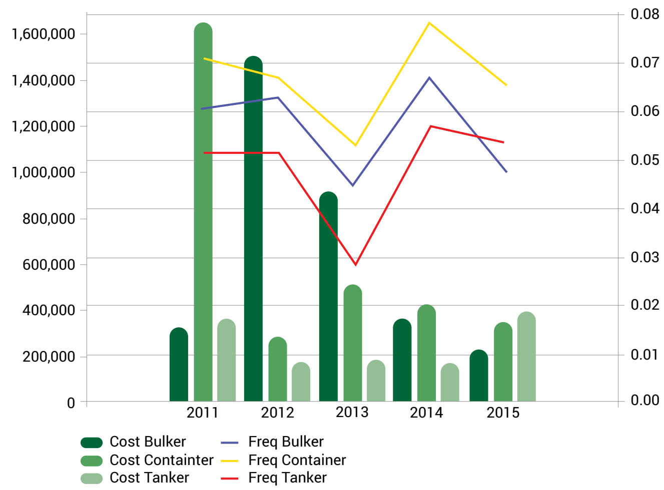
Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Collision, contact & grounding
As per 4/1/2016



Graph 3.4: Average claim cost & frequency per vessel type Claims 5,000–3,000,000 (USD)

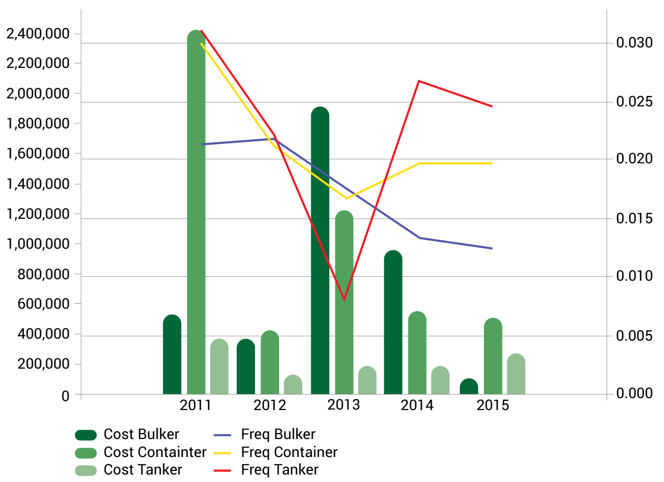
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: **Collision, contact & grounding**
As per 4/1/2016



Over the last five years container vessels have the demonstrated the highest claims frequency and cost followed by bulk carriers and tankers.

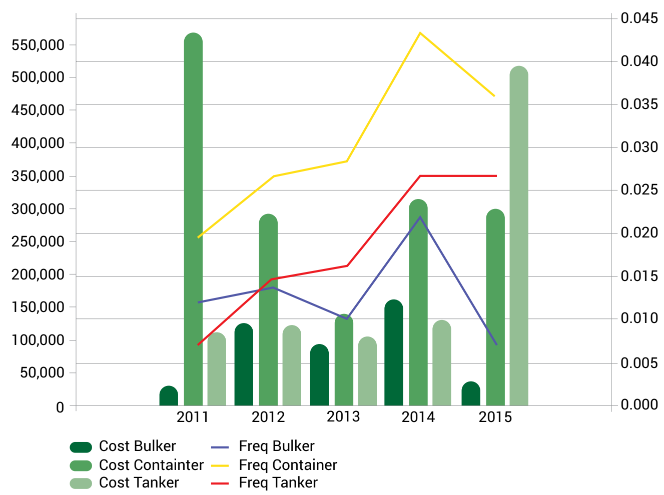
Graph 3.5: Average claim cost & frequency per vessel type Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: **Collision**
As per 4/1/2016



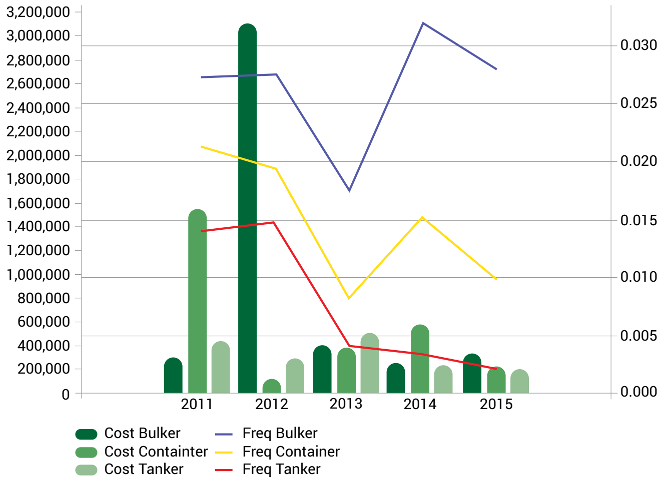
Graph 3.6: Average claim cost & frequency per vessel type Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: **Contact**
As per 4/1/2016



Graph 3.7: Average claim cost & frequency per vessel type Limit: USD claims >= 10,000 – uncapped

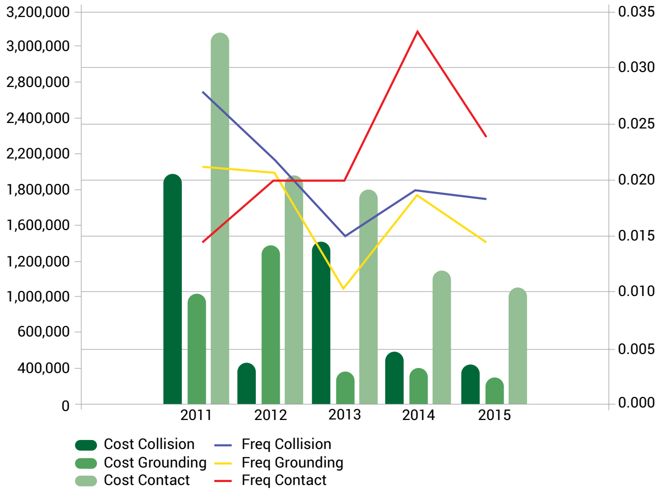
Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: **Grounding**
As per 4/1/2016



Graph 3.8: Average claim cost & frequency per category

Limit: USD claims >= 10,000 – uncapped

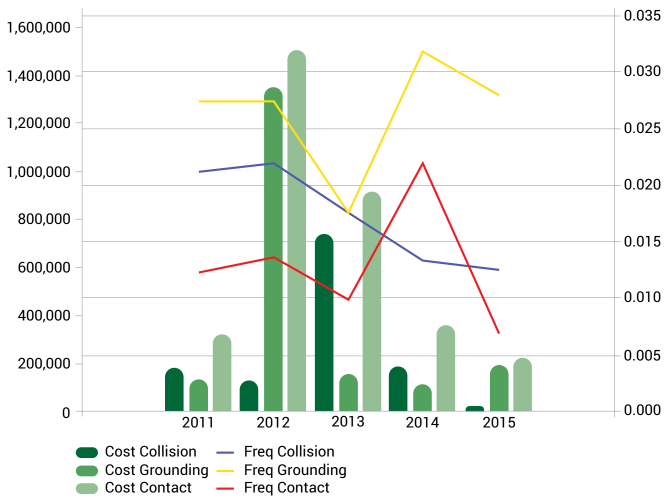
Period: 2011-2015
Types of vessel: **Bulk carrier, container and tanker**
Type of claims: Collision, contact & grounding
As per 4/1/2016



Graph 3.9: Average claim cost & frequency per category

Limit: USD claims >= 10,000 – uncapped

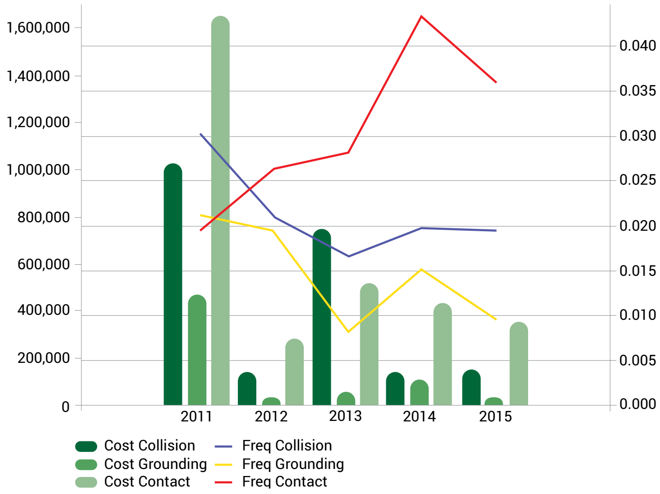
Period: 2011-2015
Types of vessel: **Bulk carrier**
Type of claims: Collision, contact & grounding
As per 4/1/2016



Graph 3.10: Average claim cost & frequency per category

Limit: USD claims >= 10,000 – uncapped

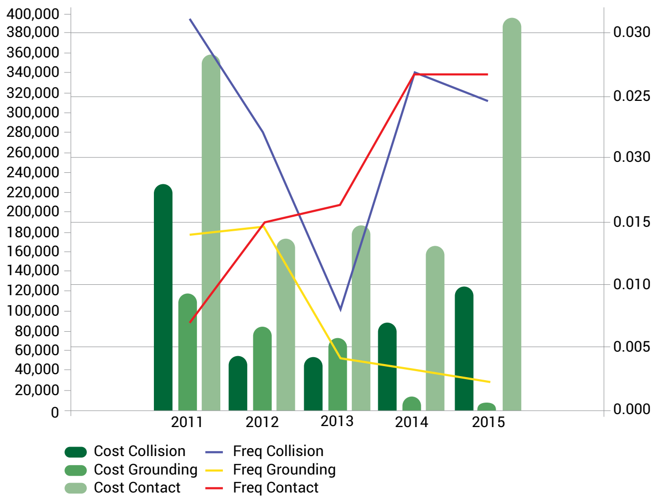
Period: 2011-2015
Types of vessel: **Container**
Type of claims: Collision, contact & grounding
As per 4/1/2016



Graph 3.11: Average claim cost & frequency per category

Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: **Tanker**
Type of claims: Collision, contact & grounding
As per 4/1/2016



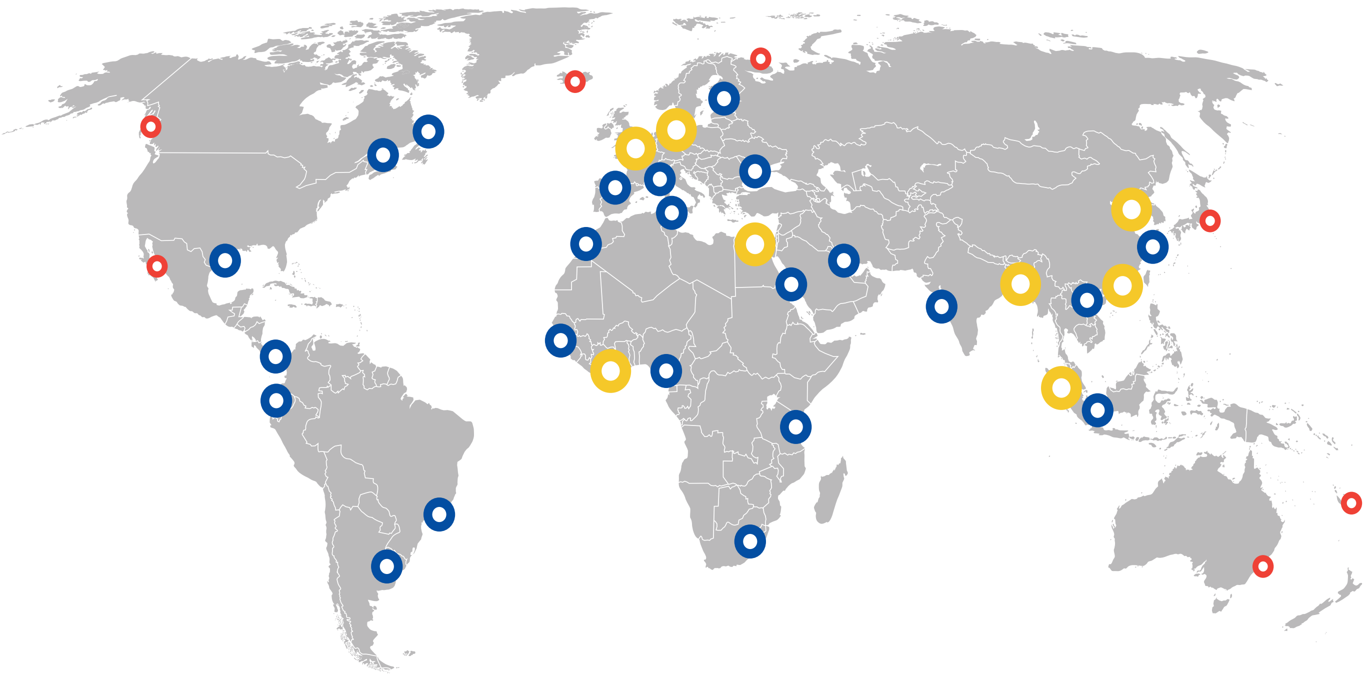
3.2 Navigational claims

3.2.1 World maps of navigational claims

Graph 3.12: World map of collisions

Limit: USD claims >= 10,000 – uncapped

Period: 2010-2014
Types of vessel: Bulk carrier, container & tanker
As per 4/1/2016



Number of Collisions: >= 10 = 2-9 = 1

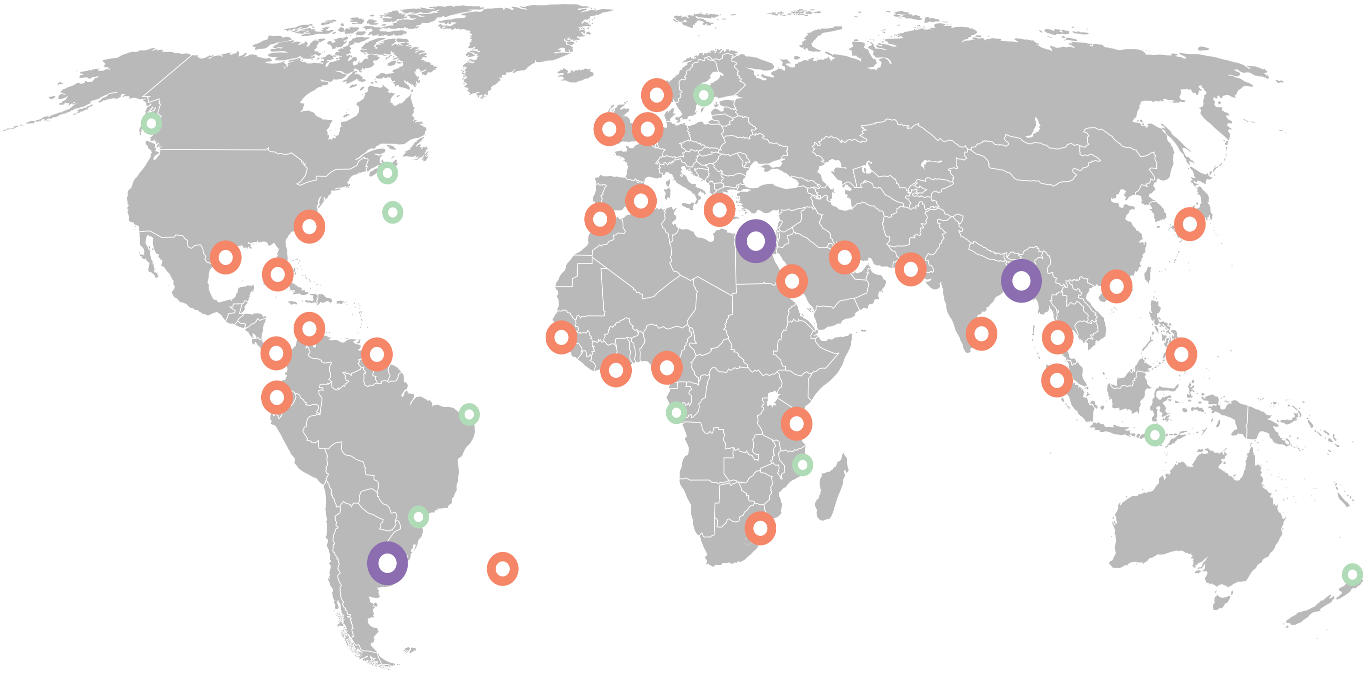
The Swedish Club's statistics show that for navigational claims container vessels have the highest claims frequency and cost followed by bulk carriers and tankers.

Review of recent years' navigational claims has shown that many casualties occurred because crew members deviated from procedures, did not discuss unexpected events, or that one person made a disastrous mistake.

Graph 3.13: World map of groundings

Limit: USD claims >= 10,000 – uncapped

Period: 2010-2014
Types of vessel: Bulk carrier, container & tanker
As per 4/1/2016

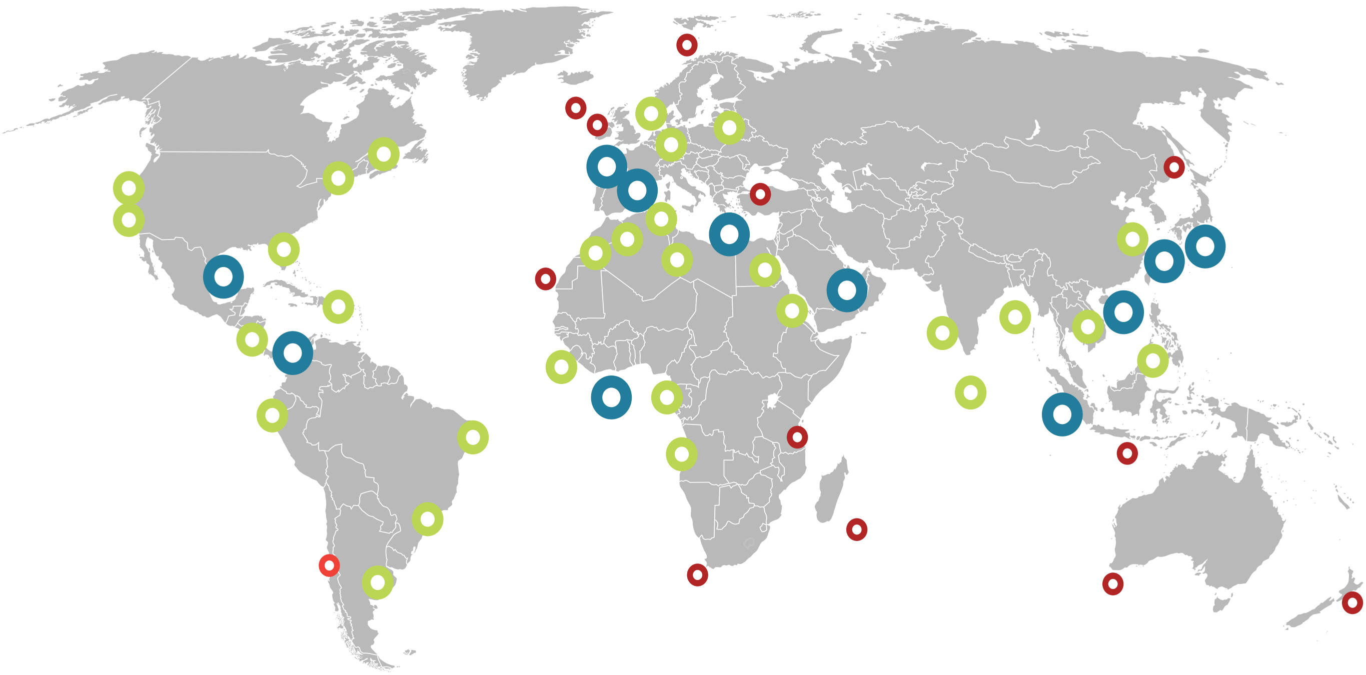


Number of Collisions: >= 10 = 2-9 = 1

Graph 3.14: World map of contacts

Limit: USD claims >= 10,000 – uncapped

Period: 2010-2014
Types of vessel: Bulk carrier, container & tanker
As per 4/1/2016



Number of Collisions: >= 10 = 2-9 = 1

3.2.2 Immediate causes

The immediate cause is usually not the root cause of a casualty. But to be able to identify the root cause the immediate cause has to be identified and rectified.

When navigating in congested waters, dense traffic or close to land, risks are increased and this needs to be acknowledged. To be prepared for these risks it is imperative that the OOW is aware of errors and the limits of the navigation equipment.

Making assumptions about displayed information, and complacency in not verifying information are also contributing factors to accidents and the Club would identify these as immediate causes.

3.2.3 Passage planning

Looking at many of these navigational claims it is obvious that the passage plan had deficiencies and that the planning had been insufficient. In addition, in some cases the bridge officers had disregarded the passage plan.

For a successful voyage consider the following when making the passage plan:

- Any paper charts being used need to be regularly updated.
- If the vessel has an ECDIS (Electronic Chart and Display Information System) the ENCs (Electronic Navigational Charts) need to be updated.
- Loading conditions and stability plan.
- Environmental areas and emission control areas.
- Any specific regulations in any area during the passage.
- Security aspects such as piracy or politically unstable areas.
- Identify no-go areas both on paper charts and electronic charts.
- It is advisable to make radar maps.
- Depth contours and limits to be highlighted with grounding line.
- Indicate clearly on the passage plan when the officer should call for extra resources such as another lookout, officer or Master.
- Have a defined point of no return.
- CPA (Closest Point of Approach) requirements for open sea and congested waters.
- Planned speed on different legs.
- Defined ROT (Rate of Turn) or turning radius for all planned alterations.
- Plan for squat and bank effect in shallow waters.
- Reporting points and requirements.
- The plan should include limits and safety margins.
- Identify when a two person check and/or double check is required.
- How many bridge team members are needed at any point in time.
- Defined bridge team roles.
- Other concerns and previous experiences.

Obtain information from:

- Routeing/pilot charts
- Pilot books
- Sailing directions
- List of Lights
- Tidal and current information
- List of radio signals
- Ship's routeing
- Updated weather
- Port information
- Berthing arrangements if known
- Information from the agent in next port

3.2.4 The bridge team

To have a safe, efficient bridge team, it is very important that all tasks are defined and familiar. In a well-functioning system, all team members should know what to expect from each other and who is responsible for what task: the goal is to eliminate assumptions.

The definitions of the duties are:

Command

- The Master always has overall command of the vessel but not necessarily of the conn.

Conning Officer (conn)

- Is in operational control.
- Informs all team members about planned manoeuvres and actions.
- Delegates defined tasks to team members.
- Requests challenges from team members when limits are exceeded.

Monitor

- Monitors the progress of the vessel and ensures that actions of the conning officer have the desired effect.
- Shall challenge the actions of the conning officer when limits in the passage plan are exceeded or when in doubt about the conning officer's actions.
- Shall be updated on the progress of the vessel to the extent that he/she can assume control of the vessel at any time.
- Under most circumstances, it is an advantage if the more senior officer acts as the monitor.

Navigation Officer (nav)

- Plotting position.
- Completing the logbook.
- Completing checklists.

Lookout

- Reporting visible traffic or objects.
- Manual steering.

Navigating

Berth-to-berth navigation procedures and how the officers are expected to execute them should be defined in the SMS. During a normal sea watch it is common to have one officer on the bridge, who will monitor the vessel's progress, and one lookout. All team members need to know the navigation policy and if any deviation is made from the passage plan the settings and limitations in the passage plan approved by the Master must be followed. Any other relevant information must be included in the passage plan for the officers to review during sailing.

The Master is key for a functional vessel. What he does, others will follow. The manager has an obligation to provide the Master with prudent, knowledgeable officers. It is however the Master's responsibility to evaluate and train the officers when they have joined the vessel. This doesn't mean that the Master himself needs to train but he must ensure that training is carried out when a new officer joins the vessel.

3.2.5 Communication

Poor communication between crew members causes casualties. It is essential that a manager emphasises the importance of efficient communication methods such as closed loop communication.

It is not always easy to communicate efficiently, especially on a vessel where the crew have different cultural backgrounds. Good communication is a cornerstone of the MRM (Maritime Resource Management) programme and there is a strong focus on the challenge of how to implement communication correctly on board a vessel.

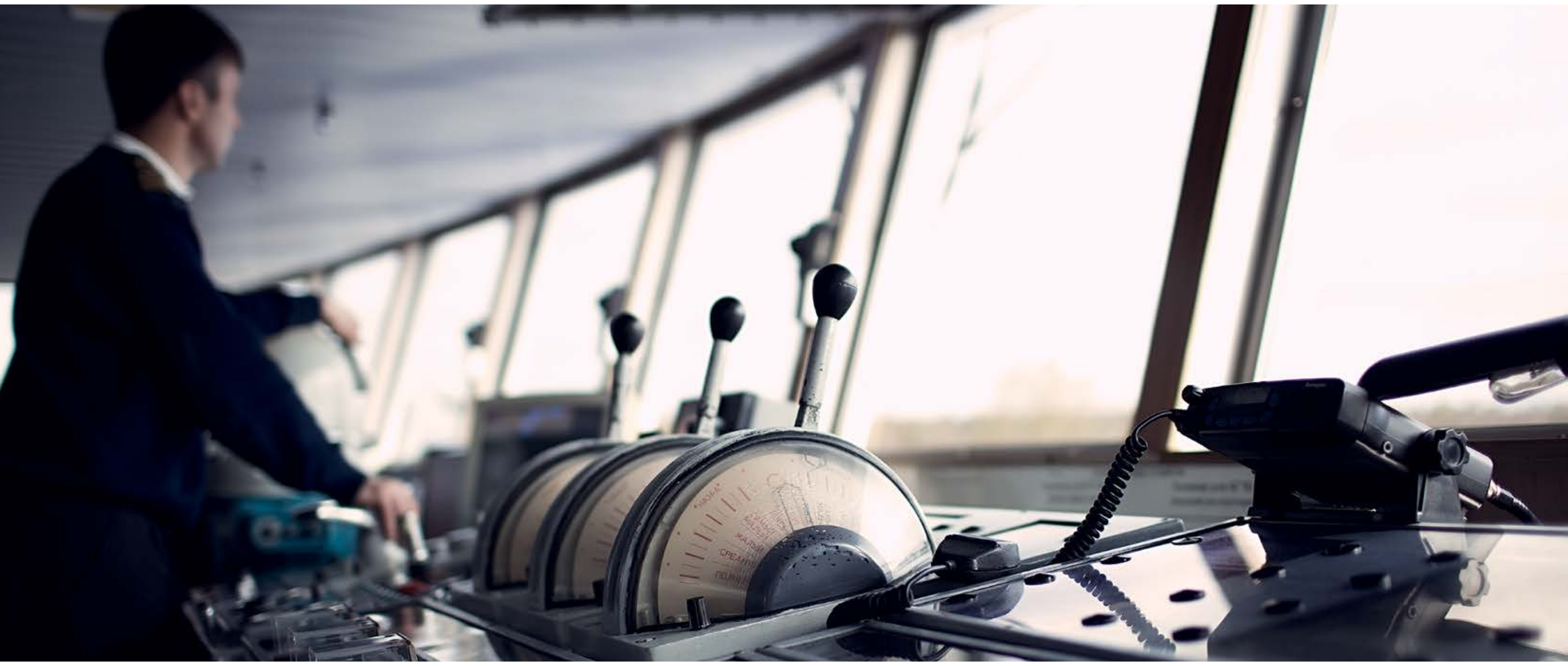
Another similar problem observed is when people in critical operations, like during navigation, do not have defined roles. To be able to identify when an error is made it is essential that the entire team knows exactly who is responsible for what tasks. This is important when there are several individuals involved, as there is no benefit to of having four people on the bridge if there is still only one person navigating.

During any critical operation it is important that there is more than one person involved in the decision making process. A two person check is commonly used when a critical decision has to be made during navigation – to ensure that the decision is not only made by one individual, the second person must confirm the action before it is executed. This procedure can productively be applied to other critical tasks e.g. working aloft, machinery overhaul or during a life boat drill.

The extra time it takes to complete a two person check is a beneficial investment in safety. No one will remember if the vessel is 20 minutes late but they will remember if a vessel made contact with a gantry crane. This approach to safety should be promoted by the manager. It is essential that the Master knows that he has the full support of the manager when taking these difficult decisions. Unfortunately the Club has seen several casualties that have been caused by the Master's lack of authority and assertiveness.

There have also been instances where a problem has been identified but disregarded as a minor issue. To prevent a casualty all problems need to be rectified, hoping for the best is very dangerous.

After new procedures have been introduced it is important to ensure these are verified during internal audits.



3.2.6 Root cause

As discussed previously, the immediate cause is generally not the root cause of an accident. There is usually a chain of errors, and if any of these errors had been identified and rectified, it is likely that the accident would have been prevented. To remedy the real reason for an accident, the root cause has to be identified, because if the root cause is not identified there is a major risk of the accident reoccurring.

3.2.7 Prevention

Preventing casualties takes a great deal of effort and commitment from the entire organisation. Inspection of companies that have improved their loss ratio shows that the best prevention is for a company to have a good safety culture. One of the first steps to achieving this is to take simple, short-term actions, some of which have been described in this publication. These actions are likely to enhance commercial operations, improve safety for the crew and minimise environmental damage.

So what is a safety culture? It is well known that defined procedures for dealing with risks will prevent many errors, and so a safety culture will embrace a set of defined and easy to understand procedures that are followed by both shore-side staff and crew covering safe management of the vessel. It is also the case that individuals must buy-in to the safety culture, understanding their own importance and responsibilities in ensuring safe operation of the vessel and the safety of its crew.

It is also important to understand what training is needed to ensure correct implementation of these procedures. This can be a difficult task and the manager has to analyse and define the areas to focus on. Correct implementation of MRM, a defined passage plan and a crew who are trained regarding company procedures and ship-specific equipment, is likely to result in a good safety culture.

Most navigational claims are caused by the same problems – whether the incident has been a collision, contact or grounding. The bridge team has failed in their communication, risks have not been assessed and vital information has not been shared.

Yet how can a manager ensure that the complex and important set of navigational tasks are performed correctly? That officers actually look out of the window, plot traffic, don't use the VHF to agree passing arrangements, keep a lookout on the bridge, follow the agreed passage plan and at the same time make sure the bridge team actually communicate with each other?

Suggested preventive measures:

- Implement a detailed navigation policy which includes descriptions and suggested settings for the bridge equipment.
- Station multiple officers on the bridge during critical operations so one person's mistake can be detected and rectified.
- Carry out a thorough audit of the navigation policy during the routine internal audit.
- Implement a specific navigational audit.
- Ensure that the Master clearly understands the consequences of not following procedures.
- Encourage crew members to understand that they are accountable for their own actions.
- The superintendent in cooperation with the Master has to ensure that the vessel has proper charts and other essential information for the vessel to complete the voyage safely.
- Employ detailed familiarisation procedures, which also verify that the officers have sufficient knowledge after completion.
- Provide clear instructions on how the VHF should be used.
- Implement a career plan which defines the training to be completed for each position.
- Supply training for all officers on how to communicate effectively.
- Provide specific training on how to effectively incorporate the pilot into the bridge team.
- All officers should receive training on how to identify risks and gain the maximum benefit from risk assessments.
- All officers should be trained on how to complete the passage plan correctly and know the risks of deviating from the plan.

3.2.8 Navigational claims conclusion

The main reason for casualties occurring is a problem with the safety culture. It could be that a safety culture is not clearly defined or properly implemented i.e. it might be defined in the SMS but for some reason not followed on board or shore-side.

On a vessel, a small error can lead to disaster. Procedures need to be easily understood, make sense and actually improve onboard safety – if not they will just be empty words and disregarded as such. The importance of following procedures should be emphasised during training, in newsletters, during evaluations and of course should be verified during internal audits, which are an efficient tool for identifying areas to focus on.

3.2.9 Interactive Root Cause Analysis (IRCA) – Navigational claims cases

IRCA: Collision

Synopsis

Vessel A departed at midnight. After the pilot had disembarked the vessel increased speed to 17 knots. Visibility was about 3-4 metres, westerly wind force 3 and calm seas. There were some commercial vessels and fishing vessels in the area.

The 2nd officer was OOW, and was assisted by a lookout. The vessel was on autopilot and both radars were running. The S-band (10 cm) was primarily on 3 miles range, north-up with the centre offset to give a better view ahead and the X-band radar (3 cm) mainly on 6 miles range.

The Master completed the night orders with his standard message and then left the bridge to get some rest. Before leaving the bridge the Master observed some fishing vessels to starboard in the distance and also some larger merchant vessels. His assessment was that none posed any concern.

Over the next 30 minutes the 2nd officer altered the vessel's heading on the autopilot several times.

Vessel B was on the portside at a distance of about 10 miles and the 2nd officer was plotting the vessel. The automatic radar plotting aid (ARPA) data indicated that vessel B would pass astern.

There were also two merchant vessels on his starboard side crossing to port with a CPA of about 0.7 miles and 1.5 miles, which were his main focus. There were also unknown numbers of fishing vessels in the area that seemed to be stationary. The 2nd officer made small alterations on the autopilot to port to stay clear of the fishing vessels. When vessel B was about 4 miles away the 2nd officer saw the lights visually. He did not take any visual bearing but monitored vessel B on the ARPA. Still not concerned he focused his attention on the fishing vessels and merchant vessels on the starboard side. The 2nd engineer did not notice any change in the CPA for vessel B.

It is the evidence of the 2nd officer that at about seven minutes before the collision at 03.55 he ordered the lookout to hand steer the vessel as close as possible to the fishing vessels. He believed this would give him more room for vessel B. At this time the OOW was also handing over the watch to the 4-8 officer.

The 2nd officer ordered starboard 10 and to steer 074 degrees. He was then concerned that this was too close to the fishing vessels and ordered 070. At the same time vessel B's bow collided with the port side of vessel A. The angle between the vessels was about 90°.

The 2nd officer did not use any signals before the collision such as the whistle, aldis lamp or VHF. Vessel B did not use any warning signals either. About 10 minutes before the collision, vessel B made an alteration 10° to port.

The Master felt the vibrations and called the 2nd officer on the bridge. The 2nd officer answered in panic and was confused so the Master ran to the bridge. The Master realised straight away that the vessel had collided and ordered the crew to investigate the damage. The voyage data recorder (VDR) had not recorded any radar images.

From vessel A's perspective

WHAT? Collision between vessel A & B.

WHY? OOW did not recognise vessel B as a concern.

WHY? OOW had poor situational awareness and tunnel vision as he did not have a complete picture of the situation.

WHY? The OOW was distracted from navigation as he was handing over the watch at the time of the accident.

WHY? The 2nd officer had not been properly familiarised with onboard routines.

WHY? The manager's training and familiarisation procedures for bridge officers was insufficient.

CONSEQUENCES
When plotting both vessels it is evident that if the vessels had maintained their headings 10 minutes before the collision the collision would have been avoided. The main fault of this collision remains with vessel B, but if vessel A had been more proactive the collision could have been prevented.

Preventive measures

- It is essential that procedures are in place outlining the specific information that must be retained by the Master after an accident. This includes the VDR record.
- If the lookout and the electronic navigation equipment are utilized correctly there should not have been a problem handling the situation.
- Even if vessel B is the give way vessel, all traffic needs to be monitored. It is essential to plan ahead and be prepared for different scenarios. In this casualty the 2nd Officer had tunnel vision. He made small alterations to port that are very difficult for other vessels to detect.
- If the officer makes small alterations to port he must be aware that this is difficult for other traffic to detect and so this should not be carried out in a high traffic area. If this cannot be avoided all traffic must be monitored and evaluated after every alteration.
- Signals should be given when it is evident that a collision is a risk, the problem here is probably that for some unknown reason neither of the vessels realised there was a risk of collision.
- It is seldom done but it is expedient to use light and sound signals if the other vessel is not doing anything to avoid the collision.
- There is no evidence that the lookout warned the 2nd Officer about vessel B, so there is also a failure in his duty.
- Even though the 2nd officer was plotting the vessel they still collided as he did not have complete situational awareness.
- The manager should verify that all officers have proper skills and attitudes before letting them take over OOW duties.
- The collision happened at the time of the normal watch handover at 0400. It is critical to not lose focus while handing over the watch. The watch should never be handed over while a manoeuvre is being completed.
- The manager has now updated these procedures:
  - All new applicants for officer level are interviewed by DS staff, TSI and DPA before an employment decision, and interviews are either via Skype or one-on-one.
  - All newly hired officers are required to complete a minimum amount of training.
  - Crewing agents should be audited about the performance records of the individual officer(s).

IRCA - Collision with vessel at anchor

Synopsis

Vessel A was raising its anchor before proceeding to the next port. The Master decided to pass ahead of vessel B that was anchored for bunkering. Vessel B was on vessel A's starboard bow, vessel A was maintaining a speed of 7 knots and a course of 122°. There was a strong southerly ebb tide of about 5 knots. The Master noticed that the vessel was setting south and altered course to port to 108°, but the course overground was 135° at a speed of 7.8 knots due to the effect of the current.

Another vessel was on the port side of vessel A, so the Master was hesitant to alter more to port even though the vessel was setting more to south and was very close to vessel B. When the vessel on the port side had passed, the Master altered the port course to 076°. The distance to vessel B was only 0.2 nautical miles.

The Master increased speed to pass ahead of vessel B. This manoeuvre failed and the starboard quarter of vessel A made contact with vessel B's bulbous bow. As a consequence, vessel B's starboard anchor chain became entangled with the propeller and rudder of vessel A.

In an attempt to separate from vessel B the Master ordered numerous ahead movements.

This manoeuvre caused further damage to both vessels including breaking vessel B's anchor chain.

Vessel A's rudder was stuck hard to port so the vessel moved in a circle and was now turning to port and risked colliding with vessel B once again. The Master dropped the port anchor and ordered full astern and the vessel finally stopped.

WHAT? Collision with anchored vessel.

WHY? The Master didn't counteract the tidal currents.

WHY? The Master didn't fully appreciate the effect of the tidal currents.

WHY? The Master lacked ship-handling skills.

WHY? The Master had not been provided with proper ship-handling training.

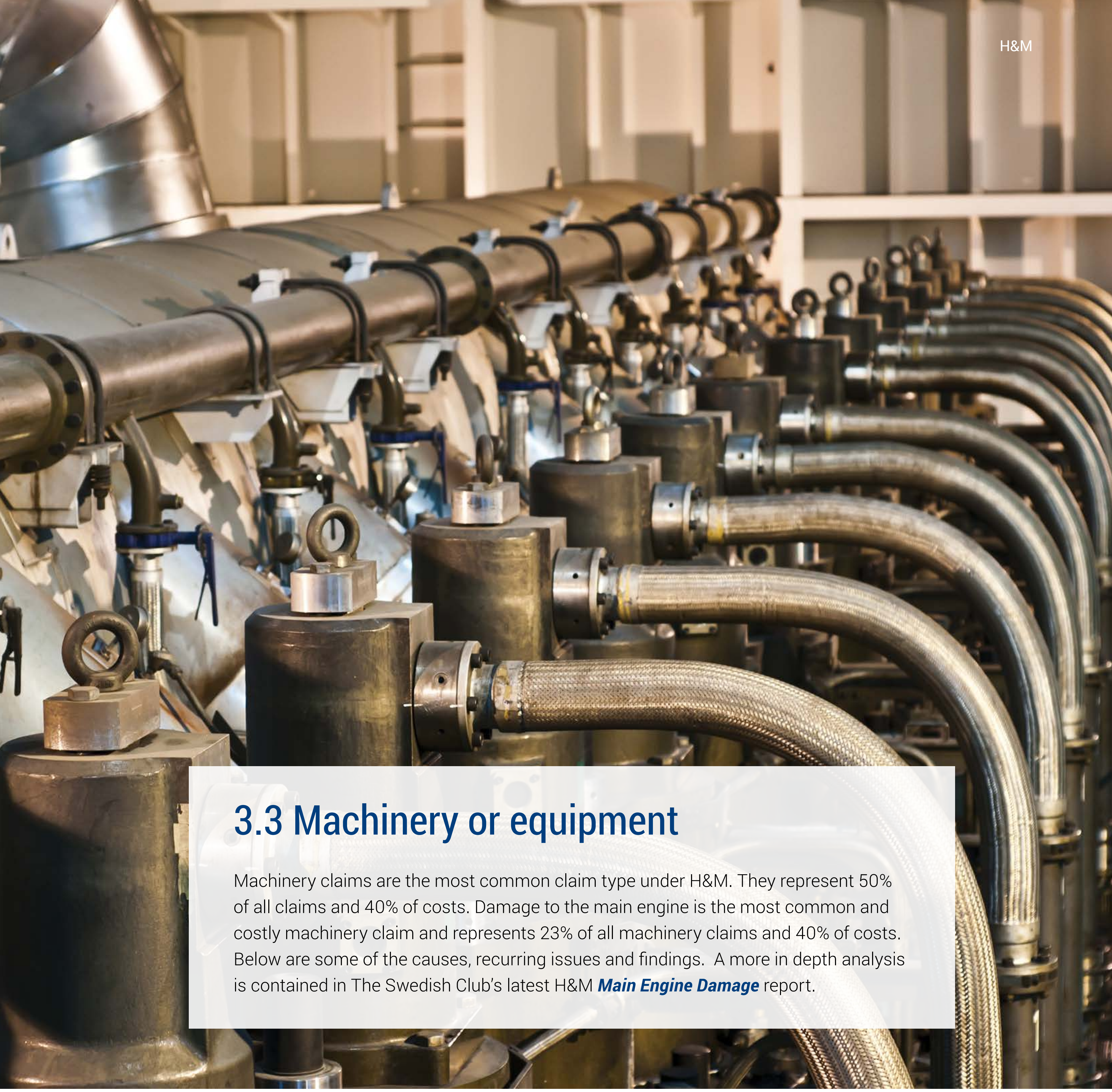
WHY? The manager had failed to ensure that the bridge team had the required skills in ship handling and analysing risks.

CONSEQUENCES

Severe damage to the propeller and structure of vessel A. The vessel was off hire for a couple of weeks while firstly completing temporary repairs and then being dry docked.

Preventive measures

- Ensure communication is by closed loop communication.
- Ensure all officers receive ship-handling training, as at the time the manager had no ship handling training in place.
- Update the risk assessment for navigating in restricted waters, which should at least include navigating in channels, anchorage, approaching pilot, departure.



3.3 Machinery or equipment

Machinery claims are the most common claim type under H&M. They represent 50% of all claims and 40% of costs. Damage to the main engine is the most common and costly machinery claim and represents 23% of all machinery claims and 40% of costs. Below are some of the causes, recurring issues and findings. A more in depth analysis is contained in The Swedish Club's latest H&M ***Main Engine Damage*** report.

Immediate causes

- Contaminated oil/fuel.
- Using untested bunkers.
- Not having experts attending major overhauls.
- Separators not operated as per manufacturers' instructions.
- Engine components not overhauled as per manufacturers' instructions.
- Crew with insufficient experience/training.
- Turbocharger damaged by foreign object.

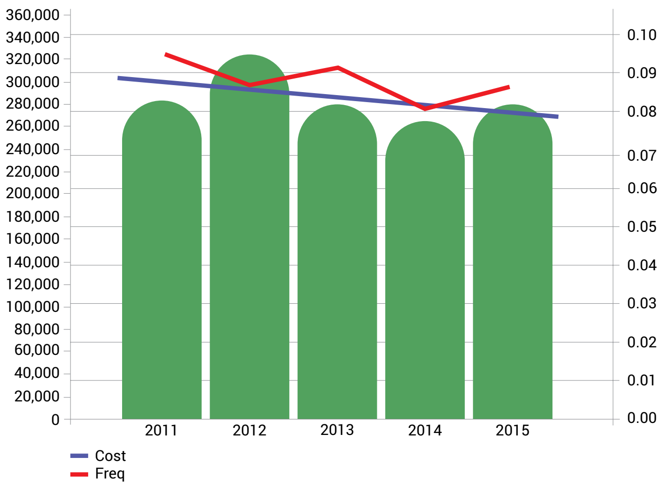
Recurring issues

- Insufficient planning.
- Insufficient experience/training.
- Non-compliance with the manager's procedures.
- Procedures which are not comprehensive enough or have not been implemented.
- Experts not present at major overhauls.

3.3.1 Statistics

Graph 3.15: Average claim cost & frequency (capped)
Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Machinery or equipment
As per 4/1/2016



Graph 3.16: Average claim cost & frequency per vessel type
Limit: USD claims >= 10,000 – uncapped

Period: 2011-2015
Types of vessel: Bulk carrier, container and tanker
Type of claims: Machinery or equipment
As per 4/1/2016

3.3.2 Main engine damage study

Findings

- Container vessels have a disproportionately large claims cost in relation to fleet entry.
- Korean built vessels make up 31% of the club fleet but amount to only 12% of main engine claims cost. China on the other hand is over-represented with 30% of the club entries and 36% of the total main engine claim costs.
- Four-stroke main engines experience 2.5 times more claims than two-stroke engines.
- V4 configuration engines have an average of 42% higher claims costs than inline engines.
- Bearing failures are the most expensive main engine claim categories with an average cost of nearly USD 1.6 million per claim. The cost for bearing failures is high due to consequential damage to crankshafts, etc.
- Lubrication failure is still the most expensive cause of damage.
- 2015 saw an increasing number of incidents regarding the main engine lubricating oil outlet diaphragm in 2-stroke main engines from Wärtsilä and MAN Diesel A/S. See Appendix (i) for preventative measures.

Maintenance

Most main engine claims are as a direct and indirect result of incorrect maintenance. Many cases were noted where damage occurred shortly after the engines were

overhauled by ship or shore staff. This emphasises the importance of correct maintenance.

Limited experience

Shortage of seafarers with experience has been highlighted before in Club publications, but it is worth repeating. This fact emphasises the importance of monitoring by shore staff. There is a significant risk that officers are being promoted before they have acquired the necessary experience for senior command. It is also important that the maintenance of all engine components is included in the PMS.

Prevention

- Implement onboard fuel management and fuel system audits. During these audits, the various parts of the fuel treatment plant (including separators) should be checked for proper function.
- It is imperative to monitor the quality of lubrication oil. Samples of lubrication oil should be sent ashore for analysis at least every three months.
- During major overhauls it is highly recommended to have an expert in attendance.
- To ensure a long service life for the boiler it is important to implement correct boiler water treatment.
- To prolong the service life of the economiser it is very important to keep it clean. This will increase the service life and minimise the risk of soot fires.
- Invest in employee training.
- Install a well-implemented and proper management system.
- It is essential that crewmembers have the necessary experience to ensure that ordinary daily work and maintenance is performed in accordance with company procedures.
- Carry out comprehensive audits and inspections.
- It is highly recommended that members have a PMS that is approved by a classification body and well-implemented both on board and ashore, with annual controls put in place by the classification body to achieve best possible results.

Many navigational claims are also caused by a loss of engine power. This once again emphasises:

- The importance of following manufacturer's instructions
- Only using original spare parts
- Completing maintenance as required
- Checking that all steering is fully operational before entering or leaving port

3.3.3 Interactive Root Cause Analysis (IRCA) – machinery claims

IRCA: Main engine damaged by contaminated lube oil

Synopsis

The vessel was sailing in good weather when the high temperature alarm for lube oil was triggered and the main engine was stopped. Investigations revealed an increased level in the sump tank and the cooling water expansion tank had lost water.

It was found that the #2 cylinder head was leaking coolant from a loosened guide bolt on the inlet valve crossbar and cooling water had contaminated the lube oil system. The cylinder head was replaced with a spare unit.

Approximately 1,000 litres of fresh oil was filled without draining off any contaminated oil. The main engine was restarted and the voyage resumed.

Two days later when the vessel was approaching the pilot station an alarm sounded, indicating a high temperature alarm for lube oil for cylinder #3. The engine was stopped and investigations were carried out.

The investigation by the crew did not reveal any abnormalities and the engine was restarted.

Shortly after the pilot embarked, the crankcase oil mist alarm was triggered and a banging noise was heard from the engine. The engine was stopped. A tug provided assistance and the vessel anchored. A couple of hours later it was decided that the vessel should be berthed with tug assistance.

WHAT? Piston seizure, damage to big-end bearing and crank pin journal.

WHY? Water contaminated the lube oil.

WHY? The sump tank was not completely drained and cleaned.

WHY? Because they didn't have a sufficient amount of fresh lube oil in reserve.

WHY? There was no company policy in place specifying the amount of lube oil to be in stock.

WHY? The manager had not identified the importance of keeping one full system charge in reserve.

CONSEQUENCES

The #3 cylinder unit had suffered piston seizure. Further damage was noted to the #3 big-end bearing and crankpin journal. The crankshaft journals were also damaged and had to be machined due to surface cracks and excessive hardness.

Preventive measures

- If the lube oil system is contaminated the entire system should be drained, cleaned and refilled with fresh oil.
- If the system is contaminated above manufacturers recommendations DO NOT START THE ENGINE without consulting the engine manufacturer.
- Lube oil samples should be taken at least quarterly and sent for analysis without delay.
- Lube oil purifier should always be in operation and kept in good working condition.
- There should always be a minimum of at least one complete lube oil charge in reserve on board.

IRCA: Blackout caused grounding and collision

Synopsis

A bulk carrier had steel products on board and was crossing the Pacific to arrive at its discharge port.

There was a change of command during the crossing. At the discharge port the pilot was picked up. The vessel proceeded up the river under manual steering. The weather was intermittently rainy but visibility was good with light winds.

There was a proper pilot exchange between the pilot and Master. The pilot was given a pilot card describing manoeuvring characteristics. The pilot checked to confirm there was an anchor watch forward, which was a requirement.

Normally the 3rd engineer is stationed at the emergency generator area during manoeuvres, but for this river transit he and the 2nd engineer had changed watch positions so the 3rd engineer could gain more experience in another area of the engine room. The 3rd engineer was completing rounds at the fuel treatment area when he noticed excessive differential pressure on the fuel filter.

Without consulting anyone he decided to carry out a manual back flush after switching from one fuel filter to another. He moved the switch-over lever only part of the way, which resulted in the fuel flow to the main engine and auxiliary engines being interrupted and leading to a total blackout.

The chief engineer and the rest of the engine room watch acted immediately but it usually takes 10– 15 minutes to recover from a blackout.

At the time of the blackout the vessel was altering course to port for a major turn of almost 90 degrees. There were no other vessels underway in the area.

The Master ordered full astern on the engine telegraph but nothing happened due to the blackout. He realised that he had no engine control, the main engine revs were falling, there was no steering control and the vessel still had some port rudder. The vessel was moving at about ten knots.

There were some smaller vessels moored at the quay in front of the vessel. The pilot ordered starboard anchor to be dropped but it had no effect.

The pilot ordered the fog signal to be sounded. He also called the berthed vessels on the VHF and the VTS and he ordered the port anchor to be dropped.

Both anchors were dropped and the vessel slowed down a little. Shortly afterwards the vessel, made contact with the quay at approximately 7 knots and continued alongside, hitting one of the vessels berthed alongside before proceeding out into the river again. The berthed vessels' moorings parted, one snapping back and damaging a vehicle parked on the wharf.

The berthed vessel drifted away from the berth as the bulk carrier wedged between it and the wharf, still making headway and scraping along the wharf, where it finally grounded.

WHAT? Contact with berth and collision with another vessel because of a blackout.

WHY? The 3rd engineer carried out a manual back flush of the fuel oil filter incorrectly.

WHY? The 3rd engineer did not have proper training for the job in question.

WHY? The chief engineer had not ensured that the engineers fully understood their job duties and the importance of following correct procedures.

WHY? The manager's handover procedures and training requirements did not specify what kind of training the engineers should have completed for each position.

WHY? The manager had not identified that there was a lack of training and knowledge on board during internal audits or superintendent's inspections.

Preventive measures

- If a task is delegated it is paramount that the person delegating that task ensures that the person carrying it out has sufficient knowledge.
- Implement minimum training requirements for each position on board the vessel.
- The crewing manager should set up a career plan for each officer, which defines required courses and training.

4 Ice – Advice for trading in the polar regions

For a more detailed report please refer to our ***Ice – Advice for trading in the polar regions*** publication.

The wealth of natural resources in the Arctic region is enormous. It is believed that up to a quarter of the world's undiscovered, recoverable hydrocarbon reserves are in the Arctic seabed. There are also huge additional iron, gold, zinc and diamond deposits, which will become more accessible if the Arctic ice continues to diminish.

Shipping activity in the polar regions is a complicated endeavour. Longer ice-free summers in the Arctic are making operations in the polar regions more accessible, combined with the development of new technology. What once seemed impossible due to rough weather and thick ice is now becoming possible. This activity will probably increase even further in the future because the search for natural resources such as oil, gas and metals is unlikely to stop.

4.1 Unique challenges faced when trading in the polar regions

To trade in the polar regions the vessel and crew are exposed to completely new challenges and risks that do not occur in normal open water sailing:

- In the polar regions temperatures can be as low as -50°C
- There are floating growlers and icebergs which are as hard as concrete
- Surveys of the region's waters are unsatisfactory
- Pollution is extremely difficult to clean-up
- Salvage equipment may not work in freezing temperatures
- It is physically exhausting to work in low temperatures

If the shipowner deems these factors surmountable it is essential that operations are planned accordingly. He needs to assess the specific risks, what assistance is available, how equipment will be affected and its limitations. There needs to be a contingency plan if vessels suffer ice damage. If a casualty occurs in the polar regions then assistance will be limited because of the lack of infrastructure. A minor incident can become a serious casualty, which could endanger the vessel, its crew and the environment.

4.2 Vessel requirements

A vessel should, as a minimum, fulfil the following requirements when sailing in the polar regions:

- Have the highest Swedish/Finnish ice-class 1A or 1A Super. It is important to remember that this ice class is not designed for vessels navigating the multiyear ice of the polar regions.
- Have the assistance of an icebreaker, which is appropriate for the conditions.
- Have completed a risk assessment for the entire voyage, which includes assessment of onboard equipment and machinery and how this equipment will handle low temperatures.
- That the shipowner evaluates what extra spare parts are needed on board for the transit.
- An ice pilot should be on board assisting the crew.
- It is essential that the ice Master on the ice breaker is fluent in English.
- The shipowner should also ensure that salvage assistance can be carried out by an approved company.
- Crews should have been given familiarisation training on sailing in the polar regions.
- The shipowner should ensure that the vessel adheres to the requirements of the ice-regime in the area. If there is no ice-regime in the area the vessel should operate as if it was sailing under an ice-regime. At the moment there are only two Arctic ice-regimes, namely the Russian and Canadian ice-regimes.
- The shipowner must inform its Hull underwriter and P&I club before trading in the polar regions.

4.3 Issues affecting trading in the polar regions

- Trading is only possible for a limited time during the year
- Ice conditions can change quickly
- Availability of ice class tonnage
- Type of cargo – oil, gas, metals and fresh fish
- Increased bunker prices
- Insurance

The development of the polar regions is ongoing and of interest to the entire shipping sector. It is vital that this development is being carried out sensitively and that risks are addressed correctly. This is a relatively new area for international and commercial shipping and it is important that there are proper regulations to govern how shipping is conducted in this region.

The harmonisation of regulations across the entire Arctic is essential. This will make it easier for shipowners, insurers and operators with interests in this region to plan and execute operations in the best way for protecting property, the environment and life.

The Polar Code created by the IMO will address many of the issues encountered by shipping in the Arctic but it is a worry that this code will not address all concerns. If this is the case it is essential that the Arctic countries and the shipping industry address these issues directly.

The Swedish Club supports all efforts to improve the standards and requirements for preventing pollution in the Arctic and Antarctic. It is encouraging to see that the Arctic Council has this as one of its top priorities. Hopefully, harmonised regulations in the Arctic will make it easier for shipping to assess the risks and plan operations accordingly. This, and the improvement in the infrastructure in the Arctic will be essential for a successful outcome, especially as shipping in the Arctic is anticipated to increase.

Regarding insurance cover, the shipowner must inform The Swedish Club if it is the hull underwriter, but it is also essential to inform the Club regarding any P&I policy as the risks in the polar regions will greatly affect the P&I exposure.

If an accident happens in the Arctic there is a concern that the complicated environmental issues with darkness and low temperatures during the winter months will complicate rescue operations and especially complicate salvage or clean-up operations.

Trading in the polar regions can be carried out safely, but for this to happen the risks need to be assessed correctly. A harmonised ice-regime between the different arctic countries is likely to be the best way to monitor shipping and enhance safety in the Arctic.

5 Risk management

Every situation must be evaluated: if there is a sudden increase in traffic then more resources are needed on the bridge; if a machinery component breaks down then priorities need to be set; if the AB who is assisting in the enclosed space entry leaves, then the inspection should be stopped.

Safety should always be the priority, but for this to work it is essential that the manager supports the Master.

For a vessel to run aground it is unlikely that one immediate cause has led to the grounding, there are usually multiple causes – what is known as a chain of error. The focus should be on identifying these problems and breaking the chain before a casualty is the outcome. If only one of these errors is rectified it is still likely that the grounding could have been prevented.

It is essential that all risks are identified before critical jobs or operations commence. In numerous cases a risk assessment has been completed but all the risks concerned have not been identified. To be able to carry out a correct risk assessment there first has to be a risk analysis, which uses all available information to identify hazards and to estimate the risk to the environment, property or individual. The purpose of a risk assessment is to carry out a careful examination of shipboard operations, evaluating the risk arising from a hazard and to verify that there are adequate controls in place which make that level of risk acceptable.

If a risk assessment has been completed correctly it is likely that most risks will be addressed. If a work permit has also been issued for the specific job it should be obvious to crew members how to safely complete the job.

The reason why risk assessments are ignored is usually because the manager has not been able to explain the importance and benefit of following the requirements.

After a casualty it is common that managers distribute a memorandum regarding the casualty fleet wide and within the organisation. For this to be efficient it is essential that the lessons learned are implemented in the SMS, otherwise there is a risk that these lessons are forgotten or even ignored completely.

This is similar to the process of employee training, which is proven beneficial when the goals of the training are implemented in the SMS, but which, if not, can be time wasted with employees returning to old habits.

There is also a risk that, due to the current shortage of officers, younger officers are being promoted before they have acquired the necessary experience for senior command. To ensure that seafarers have the required knowledge it is essential that they receive proper training, and that what is required of them is clearly defined in the SMS.

6 Prevention

The Swedish Club's publications identify problematic areas which should be focused upon to minimise the risk of an accident happening. Like all insurers it handles a great many claims and so can identify that many of the causes of these claims are recurring. The Club believes that by highlighting these recurring problems and giving advice on important areas of focus, it can prevent future accidents.

To prevent accidents people must understand why mistakes are being made and why the crew disregarded procedures.

Recurring issues

The issues that have been identified this year through IRCA cases are similar to those identified in previous years' Claims at a Glance. The Swedish Club believes that if these issues are identified and rectified, its members' performance will improve.

There are many recurring problems that lead to casualties. The causes are similar in both P&I and H&M.

- The crew does not follow manager's procedures.
- The manager has failed to implement procedures correctly.
- Procedures were not sufficient in dealing with associated risks.
- The SMS and other procedures overlooked important issues.
- Inexperience and ignoring procedures (which must be addressed with training).
- Lack of situational awareness.
- The manager had not taken enough preventive measures when a problem had been identified.
- Poor communication and lack of planning.
- People do not recognise risks or believe it is acceptable to take risks.
- There is a lack of training both on board and ashore.

Taking a shortcut while sitting behind a desk in an office is rarely life threatening. However, taking a shortcut while at sea might lead to the end of a career, injury, death, jail or pollution of the ocean and shores. The consequences are severe, which is why it is important to understand the outcome of any actions taken.

The Swedish Club believes that the root causes need to be identified and rectified in order to truly learn from an accident and to prevent it from recurring. Establishing a good loss prevention culture in an organisation cannot be underestimated, but it is a time consuming and difficult process.However, the benefit of preventing a single casualty cannot be overstated as the average claim cost for a P&I claim is USD 80,000 and for H&M it is over USD 500,000.

There should be a focus on preventive measures and identification of areas of risk that could potentially lead to a casualty. The main focus should be on training personnel both at sea and ashore in understanding and recognising when a vessel or person is exposed to an unacceptable risk.

7 Conclusion

Prevention is all about evaluating one's own organisation, knowing how people act and understanding what is needed to assist all personnel to perform safely in a safe environment. Prevention not only needs to be addressed at an individual level, but also throughout the entire organisation.

Preventive measures that are beneficial for an organisation must be evaluated on an individual basis for every manager. Casualties can be prevented and should be prevented.

8 Appendices

Appendix (i)

Main engine lubricating oil outlet diaphragm

Symptoms
In 2015 The Swedish Club saw an increasing number of incidents regarding the main engine lubricating oil outlet diaphragm. The engine configurations concerned are all 2-stroke main engines from Wärtsilä and MAN Diesel A/S.

Consequences
In all cases excessive quantities of water on the tank top entered the main engines' sump tank via the defective diaphragm and subsequently contaminated the main engine lubricating oil system, resulting in severe damage to the main engine bearings and journals. The repair cost for engine damage can easily reach millions of dollars, and this does not take into account any loss of time, towage, transshipment of cargo and other commercial embarrassment caused by the casualty.

Manufacturers' recommendations
The design of both Wärtsilä and MAN Diesel A/S lubricating oil outlet diaphragms are quite similar.

- Wärtsilä has recommended inspection/replace at 40,000 running hours or at dry dock.
- MAN Diesel A/S, Denmark, has released a service letter SL08-492/JVG, March 2008. It says: In order to avoid water entering the main engine sump tank through a defect in the crankcase oil outlet, it is recommended to inspect the diaphragm sealing in the crankcase oil outlet every 32,000 hours of operation, and replace the diaphragm if indicated by the inspection.

Preventive measures
All situations with excessive water on the tank top in connection with defective diaphragms are critical. During a dry-docking it is, for various reasons, more common to have water on the tank top than during normal operations.

In line with the recommendation issued by MAN Diesel A/S, Copenhagen, we recommend that all diaphragms are replaced in connection with every relevant scheduled inspection of the ship.

If heavy contamination of water is present in the system:

1. The lube oil in the sump tank must be transferred to a settling tank
2. The sump tank and crank case should be cleaned
3. Fresh oil filled to the level recommended by the engine maker

Observations
In recent incidents we noted that none of the vessels had enough lubrication oil on board to completely replenish the system.

The cost of inspection/replacement is minimal compared to the consequences if left unattended. Have spare diaphragms on board at all times.

Appendix (ii)

Upcoming IMO legislation & requirements

(For comprehensive and updated information about new requirements please refer directly to IMO.)

- The environmental aspects of the Polar Code were adopted at MEPC 68. Coupled with the previously adopted safety aspects, the code is now confirmed to enter into force on 1 January 2017.
- The International Code of Safety for ships using gases or other low flashpoint fuels (IGF Code) for ships using gas as fuel was adopted. Work will continue to develop requirements for other low-flashpoint fuels. The basic philosophy of the IGF Code is to provide mandatory provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using low flashpoint fuels, such as liquefied natural gas (LNG), to minimise the risk to the ship, its crew and the environment, with regard to the nature of the fuels involved.

Updates to existing legislation & requirements

(For comprehensive and updated information about new requirements please refer directly to IMO.)

- **Update to SOLAS 1974 Regulations II-2/1 and II-2/19, Carriage of Dangerous Goods.** Carriage of dangerous goods in packaged form will be mainly affected while little or no effect will be noticeable on carriage of solid dangerous goods in bulk.
- **International Code of Safety for High-Speed Craft, 2000 (HSC Code 2000) Paragraph 7.17, Fire Safety.** Similar amendments were approved for SOLAS chapter II-2.
- **SOLAS 1974 Regulation V/19 – Carriage Requirements of ECDIS: Type of Ships = Others.** 50,000 GT and above, existing ships not later than first survey on or after 1 July 2016.
- **2010 STCW Convention and STCW Code.** The new requirements will apply to all vessels (existing and new, of all the ship types). While the requirements entered into force on 1 January 2012, there is a 5-year transitional period granted for taking full effect (until 1 January 2017).
- **SOLAS 1974 Regulation II-1/3-11 - Corrosion Protection of Cargo Oil Tank of Crude Oil Tankers** - to new crude oil tankers of 5,000 dwt or above engaged on international voyages from the following date: contract date: 1 January 2013; or keel laid date (in the absence of a building contract): 1 July 2013; or delivery date: 1 January 2016.
- **Amendments to the SOLAS Regulation III/1 – on-load release mechanisms and to the LSA Code paragraph 4.4.7.6 – on-load release hooks.** - to lifeboat on-load release hooks as required by SOLAS chapter III (on passenger ships regardless of tonnage engaged on international voyages and cargo ships (non-passenger ships) of 500 gt or over engaged on international voyages). It is tentatively agreed that implementation (after the entry into force of the requirement) will be 1 July 2014 for new ships, and first scheduled dry docking for existing ships. However, it should be noted that design appraisal of the on-load release mechanism and other necessary verification work should be completed well before that date.
- **New Chapter 4 of MARPOL Annex VI –Energy Efficiency Design Index (EEDI).** The EEDI is a design index for a ship's energy efficiency. It was originally developed as a non-mandatory instrument to help control CO2 emissions from shipping but now the EEDI is mandatory under Annex VI of the MARPOL Convention, which was concluded at MEPC 62 (July 2011). Further amendment was introduced with resolution MEPC.251(66).
- **Amendments to SOLAS Regulation II-2/10.10.1 - audible alarm device to notify low air pressure in self-contained breathing apparatus cylinders.** The new requirement will apply to new ships constructed on or after 1 July 2014. Existing ships will be required to comply accordingly by 1 July 2019.
- **New SOLAS Regulation II-1/3-12.** Protection against noise and amendment to SOLAS Regulation II-1/36 (to delete the regulation in view of the new regulation II-1/3-12).
- **New SOLAS Regulation II-2/10.4 - communication equipment for fire-fighting teams.** Applicable to all new SOLAS ships constructed on or after 1 July 2014. Existing ships should comply with this requirement not later than the first survey after 1 July 2018.
- **New SOLAS Regulation III/17-1 - recovery of persons from the water.** Applicable to new SOLAS ships constructed on or after 1 July 2014. To existing SOLAS ships by the first intermediate or first renewal survey after 1 July 2014.
- **Amendments to SOLAS Regulation II-1/29 concerning requirements for steering gear trials.** Applicable to SOLAS ships where it is impracticable to demonstrate compliance with the requirements for testing steering

gear at the deepest draught whilst on sea trials. The methods will be available to any ships (new or existing), which test steering gear during sea-trials from 1 January 2016.

Adopted IMO requirements entering into force 1 January 2016

(For comprehensive and updated information about new requirements please refer directly to IMO.)

- **The Revised MARPOL Annex VI (Chapters 1 - 3).** Tier III NOx controls will apply for new ships from 1 January 2016, which will sail in the existing NOx emission control areas.
- **Amendments to SOLAS Regulation II-1/29 concerning requirements for steering gear trials.** Applicable to SOLAS ships where it is impracticable to demonstrate compliance with the requirements for testing steering gear at the deepest draught whilst on sea trials. The methods will be available to any ships (new or existing), which test steering gear on sea-trials from 1 January 2016.
- **Amendments to SOLAS Regulations II-2/3 and II-2/9.7 concerning fire resistance of ventilation ducts for new ships.** The new requirements will apply to new cargo ships and passenger ships constructed (keel laid) on or after 1 January 2016.
- **Amendments to SOLAS Regulations II-2/4.5.5 and II-2/16.3.3, FSS Code Chapter 15 as well as the IBC Code for requiring inerting for tankers of less than 20,000 dwt but more than 8,000 dwt.** Applicable to new oil and chemical tankers, carrying low flash point cargoes (not exceeding 60°C as determined in accordance with SOLAS II-2/1.6), constructed (keel laid) on or after 1 January 2016.
- **Amendments to SOLAS Regulation II-2/10 concerning fire protection requirements for on-deck cargo areas of new ships designed to carry containers and associated MSC circular on guidelines for the design, performance, testing and approval of mobile water monitors.** In general, the requirements will apply to new ships only. These requirements may also be extended to existing ships, when sufficient experience is gained with the use of this equipment.
- **Amendments to SOLAS Regulation II-2/13.4 concerning additional means of escape from machinery spaces.** These requirements will apply to new cargo and passenger ships only.
- **Amendments to SOLAS Regulations II-2/1, II-2/3, and II-2/20-1 concerning protection of vehicle, special category and ro-ro spaces (and application).** These requirements will generally apply to "Vehicle Carriers", which carry HFCVs (Hydrogen Fuel Cell Vehicles) and CNGVs (Compressed Natural Gas Vehicles).
- **Amendments to the LSA Code concerning reference test devices (RTDs) for lifejackets.** The new requirements will apply to the manufacture and testing of new SOLAS lifejackets.
- **Amendments to the 2011 International Code on the enhanced programme of inspections during surveys of bulk carriers and oil tankers (ESP Code).** The new survey requirements of the 2011 ESP Code are applicable to oil tankers and bulk carriers (including ore carriers and combination carriers) of 500 gt and above and will be enforced at the first survey after the entry into force date.
- **Amendments to the STCW Code related to minimum in-service eyesight standards for seafarers.** Applicable to seafarers certification; applicable to all the vessels (existing and new, of all the ship types).
- **Comprehensive revision of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).** The Code will apply to new gas tankers constructed (keel laid) from 1 July 2016, although the revised code will enter into force on 1 January 2016.
- **Demonstration of compliance with damage stability requirements for tankers.** These amendments are applicable to new and existing tankers (oil, chemical and gas). Existing oil and chemical tankers will have to fit a stability instrument by the first scheduled renewal survey of the ship on or after 1 January 2016 but no later than 1 January 2021. Existing gas tankers, certified under the IGC Code, will have to comply by the first renewal survey on or after 1 July 2016 but no later than 1 July 2021. Existing pre-IGC Code gas tankers will have to comply by the first renewal survey on or after 1 January 2016 but no later than 1 January 2021.
- **MARPOL Annex IV - Establishment of Special Area under MARPOL Annex IV (Sewage) in the Baltic Sea.** All passenger ships visiting the Special Area will be required to comply with the above requirements. The application dates were agreed at MEPC 68, as follows: For new passenger ships will be from 1 June 2019; and for existing passenger ships will be from 1 June 2021.

Adopted IMO requirements entering into force 1 March 2016

(For comprehensive and updated information about new requirements please refer directly to IMO.)

- **Amendment to MARPOL Annex I, Regulation 43 - use and carriage of heavy grade oil (HGOs) in the Antarctic area.** Ships operating in the Antarctic area from the date of entry into force.

- **Amendments to MARPOL Annex III - amendments to the appendix on criteria for the identification of harmful substances in packaged form.** Applicable to all ships carrying harmful substances in packaged form from 1 March 2016.
- **Amendments to MARPOL Annex VI, Regulations 2 and 13 – amended to include gas fuelled engines.** Applicable on 1 March 2016, but – Regulation 2 - all candidate gas engines on ships constructed on or after the relevant ECA-NOx date or additional / non-identical replacement engines installed on or after those dates as applicable. Gas engines in this context are understood to be gas only fuelled engines – engines which use dual fuel (i.e. main fuel gas but with a liquid pilot fuel) are already covered. Regulation 13 - candidate engines on ships constructed 1 January 1990 – 31 December 1999, which have been so altered from their original condition that the AM in respect of engines in their original condition does not now apply.
- **Amendments to MARPOL Annex VI, Supplement to the IAPP Certificate.** All ships subject to MARPOL Annex VI certification (ships engaged in the international voyage of 400 gt, including offshore structures). Certificates issued or replaced on or after 1 March 2016.

Adopted IMO requirements entering into force 1 July 2016

(For comprehensive and updated information about new requirements please refer directly to IMO.)

- **Amendments to SOLAS Regulation VI/2 to require mandatory verification of container weight.** The requirements will apply to all containers to which the International Convention for Safe Container (CSC) applies and which are to be stowed on a ship subject to SOLAS chapter VI.
- **Amendments to SOLAS and the relevant codes concerning mandatory carriage of appropriate atmospheric testing instruments on board ships.** Applicable on all new and existing ships.
- **Amendment to SOLAS Regulation II-2/10.5.2 - clarification on the application of SOLAS regulation II-2/10.5.2.2 relevant to the provision of additional fire-extinguishing arrangements.** All ships constructed on or after 1 July 2012.
- **SOLAS 1974 Regulations II-1/2 and II-1/3-10 – goal-based ship construction standards for bulk carriers and oil tankers.** Applicable on oil tankers of 150 metres in length and above and bulk carriers of 150 metres in length and above, constructed with single deck, top-side tanks and hopper side tanks in cargo spaces, excluding ore carriers and combination carriers: – for which the building contract is placed on or after 1 July 2016; – in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2017; or – the delivery of which is on or after 1 July 2020.
- **SOLAS 1974 Regulation V/19 – carriage requirements of ECDIS.** Applicable on all SOLAS cargo ships (new and existing).

Adopted IMO requirements entering into force 12 December 2016

(For comprehensive and updated information about new requirements please refer directly to IMO.)

- **2014 Amendments to the Maritime Labour Convention, 2006.** Applicable for all ships except warships and naval auxiliaries, ships engaged in fishing or similar pursuits, ships of traditional build such as dhows and junks and those that navigate exclusively in inland waters or waters within, or closely adjacent to, sheltered waters or areas where port regulations apply.

Loss Prevention

The Loss Prevention unit is placed within the Strategic Business Development & Client Relations department and provides active loss prevention support, analysis and reports, as well as advice to members.

Lars A. Malm
Director, Strategic Business Development & Client Relations

Telephone: +46 31 638 427
E-mail: lars.malm@swedishclub.com

Anders Hultman
Loss Prevention Coordinator

Telephone: +46 31 638 426
E-mail: anders.hultman@swedishclub.com

Joakim Enström
Loss Prevention Officer

Telephone: +46 31 638 445
E-mail: joakim.enstrom@swedishclub.com

The Swedish Club

Contact

Head Office Gothenburg
Visiting address: Gullbergs Strandgata 6,
411 04 Gothenburg
Postal address: P.O. Box 171,
SE-401 22 Gothenburg, Sweden
Tel: +46 31 638 400, Fax: +46 31 156 711
E-mail: swedish.club@swedishclub.com

Emergency: +46 31 151 328

Piraeus
5th Floor, 87 Akti Miaouli, 185 38 Piraeus, Greece
Tel: +30 211 120 8400, Fax: +30 210 452 5957
E-mail: mail.piraeus@swedishclub.com

Emergency: +30 6944 530 856

Hong Kong
Suite 6306, Central Plaza, 18 Harbour Road,
Wanchai, Hong Kong
Tel: +852 2598 6238, Fax: +852 2845 9203
E-mail: mail.hongkong@swedishclub.com

Emergency: +852 2598 6464

Tokyo
2-14, 3 Chome, Oshima, Kawasaki-Ku
Kawasaki, Kanagawa 210-0834, Japan
Tel: +81 44 222 0082, Fax: +81 44 222 0145
E-mail: mail.tokyo@swedishclub.com

Emergency: +81 44 222 0082

Oslo
Dyna Brygge 9, Tjuvholmen
N-0252 Oslo, Norway
Tel: +47 9828 1822, Mobile: +47 9058 6725
E-mail: mail.oslo@swedishclub.com

Emergency: +46 31 151 328

London
New London House, 6 London Street
EC3R 7LP, London, UK
Tel: +46 31 638 400, Mobile +44 7539 132 795
E-mail: swedish.club@swedishclub.com

Emergency: +46 31 151 328

Printed by: PR-Offset, Sweden
1606pr1500/E8