

# P&I Claims Analysis



2016



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# 1 Executive summary

## 1.1 Cargo

### Type of cargo claims

Costly cargo claims are often due to catastrophic claims, such as total losses; fires; or navigational claims, which we define as collisions, contact or groundings.

Apart from catastrophic claims, the most expensive cargo claims are contamination. This means that cargo was contaminated or not in a proper condition when loaded, which is usually caused by an inherent vice or water leaking through cargo hatches.

### Bulk carriers

**Wet damage** – mainly caused by:

- Improper cargo handling shipside
- Improper cargo handling shore-side
- Cargo being 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 being properly calculated
- Incorrect cargo handling shipside or shore-side

**Contamination** – mainly caused by:

- Improper cargo handling shipside
- Improper cargo handling shore-side
- 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\*

\*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.



### Concerns on 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).

### Container vessels

**Physical damage** – mainly caused by:

- Incorrect cargo handling shore-side
- Heavy weather

**Wet damage** – mainly caused by:

- Leaky cargo hatches
- Flooding of holds
- Pipes and valves in poor condition

### Concerns on container vessels

- Not securing containers according to the cargo manual
- Charterer's loading plan differs from the vessel's cargo plan
- Cargo manifest is not correct and does not include all International Maritime Dangerous Goods (IMDG) cargo
- Reefer containers need to be monitored during the voyage because 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

## Tankers

**Shortage** – mainly caused by:

- Loaded or unloaded cargo not properly calculated
- Incorrect cargo handling shipside or shore-side

**Contamination** – mainly caused by:

- Insufficient tank cleaning
- Mixing of cargo
- Cargo contaminated prior to loading

**Concerns on chemical/product tanker**

- 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 charterer's instructions
- Not maintaining required cargo temperatures
- Incorrect soundings
- Contamination of palm, vegetable, and coconut oils which have little value once contaminated leading to expensive claims

## 1.2 Injury

We have observed that slips and falls are the biggest concern over all three types of vessel.

**Slips and falls** – mainly caused by:

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

**Being struck by falling objects** – mainly caused by:

- Equipment not secured for sea

**Being caught in machinery** – mainly caused by:

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

## 1.3 Illness

**Cardiovascular disease**

The most common illness on board all three types of vessel is cardiovascular disease, which is also the most costly. It is mainly caused by:

- Obesity
- Poor diet
- Smoking
- Physical inactivity

## 1.4 Overall causes

- Lack of training, both regarding company procedures and practical skills.
- Taking unnecessary risks.
- Lack of experience.
- Complacency.
- Ignoring best practices and approved procedures.
- Lack of belief in safety and over confidence in one's own ability.
- Generic company procedures which are not suitable for the vessel's trade and operation.
- Lack of communication between crew members.
- Poor communication between crew and office staff.
- Not acknowledging cultural differences between nationalities, company and professions.
- Not being assertive when spotting mistakes being made.

## 2 Frame of reference 2005–2014

### Claim categories:

- Cargo
- Injury
- Illness

### Claims intervals:

- USD 5,000 – USD 3,000,000
- USD 1,000 – USD 3,000,000

### Types of vessel:

- Bulk carriers
- Container vessels
- Tankers

### Claim categories – vessel/years and number of claims:

Cargo – Total casualties: 1,459

Illness – Total casualties: 957

Injury – Total casualties: 895

## 3 Introduction

The Swedish Club closely monitors the frequency of different types of claim and prioritises identifying the patterns and trends derived from loss statistics. Another priority of course is sharing this important data with our members and business partners. Merely observing is not good enough – we need to analyse why things happen and how we can help our members prevent them from happening again. In this publication you will find a number of measures you can adopt to prevent casualties from occurring.

To make this study and analysis conclusive, we limited the types of vessels to bulk carriers, container vessels and tankers which represent 80% of our insured vessels.

For the same reason, we have restricted the number of claim categories in order to be representative of the Club's overall claims experience. The chosen claim categories are cargo, illness, and injury, which represent the highest frequency of claim. Other categories, such as pollution and other P&I claims (including wreck removal liabilities)

show a much higher severity on average. Fortunately, these claims are infrequent and their scarcity makes it difficult to establish a trend or pattern. They are often connected to a catastrophic navigational claim, such as a collision, contact or grounding.

Another important decisive factor as to whether or not a "like-for-like" comparison between the vessel and claim types can be made, is whether the vessels' trading patterns and number of crew on board are similar. For bulk carriers, containers and tankers we can make this comparison.

Costs have risen over the last ten years, with this rise mainly affecting the frequency of claims above USD 5,000 after the deductible. For claims below USD 5,000 there is actually a drop in frequency.

We also believe that more intense trade with less time on board to prepare for critical operations has resulted in a higher number of crew-related incidents.

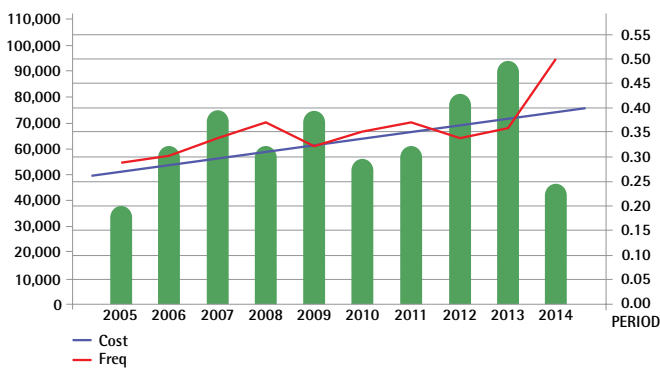


# 4 General statistics

Below are statistics combining the most frequent P&I claims, (cargo, illness and injury) on bulk carriers, container vessels and tankers.

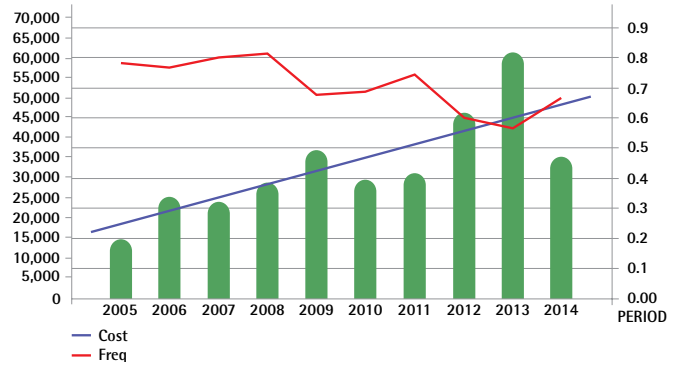
**Graph 4.1: Average claims costs & frequency  
Claims 5,000–3,000,000 (USD)**

Period: 2005 - 2014  
Types of vessel: Bulk carriers, containers and tankers  
Type of claims: Cargo, illness and injury  
As per 25/9/2015



**Graph 4.2: Average claims costs & frequency  
Claims 1 - 3,000,000 (USD)**

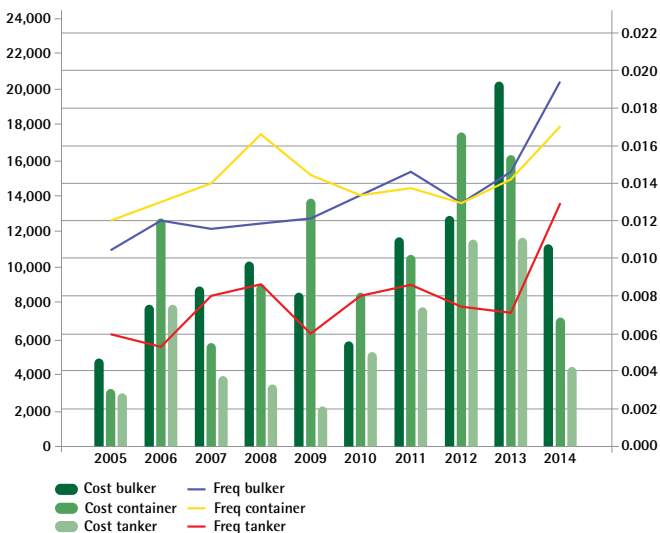
Period: 2005 - 2014  
Types of vessel: Bulk carriers, containers and tankers  
Type of claims: Cargo, illness and injury  
As per 25/9/2015



The conclusion from Graph 4.1 and Graph 4.2 is that the frequency for claims above USD 5,000 is increasing.

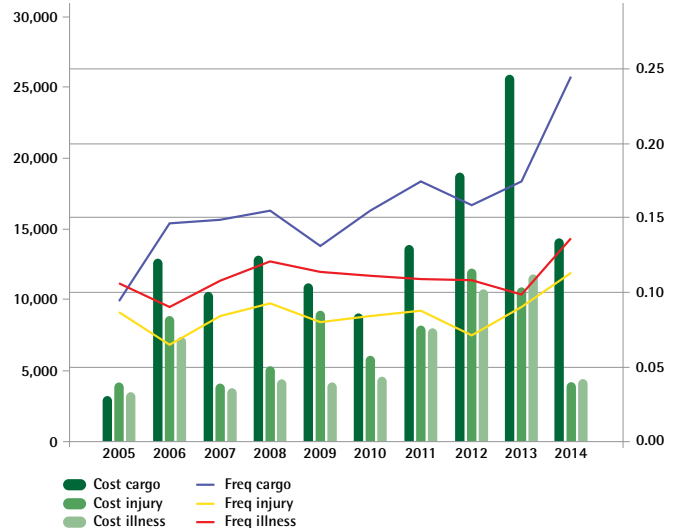
**Graph 4.3: Claims costs and frequency  
per type of vessel  
Claims 5,000–3,000,000 (USD)**

Period: 2005 - 2014  
Types of vessel: Bulk carriers, containers and tankers  
Type of claims: Cargo, illness and injury  
As per 25/9/2015



**Graph 4.4: Claims costs and frequency  
per category  
Claims 5,000–3,000,000 (USD)**

Period: 2005 - 2014  
Types of vessel: Bulk carriers, containers and tankers  
Type of claims: Cargo, illness and injury  
As per 25/9/2015





Graph 4.3 shows the cost per insured vessel by vessel type. The frequency and cost for tankers is the lowest of the three types of vessel, however, the frequency and cost for containers is rising. For bulk carriers the frequency has been rising since 2009.

It should be understood that due to time lag in recording the claims costs for 2014 the picture may be different in time. This is unavoidable with statistics of this nature.

Graph 4.4 shows the frequency and cost for the three claim categories. For all three categories the frequency has increased significantly over the last couple of years. This is a worrying trend which we are monitoring.

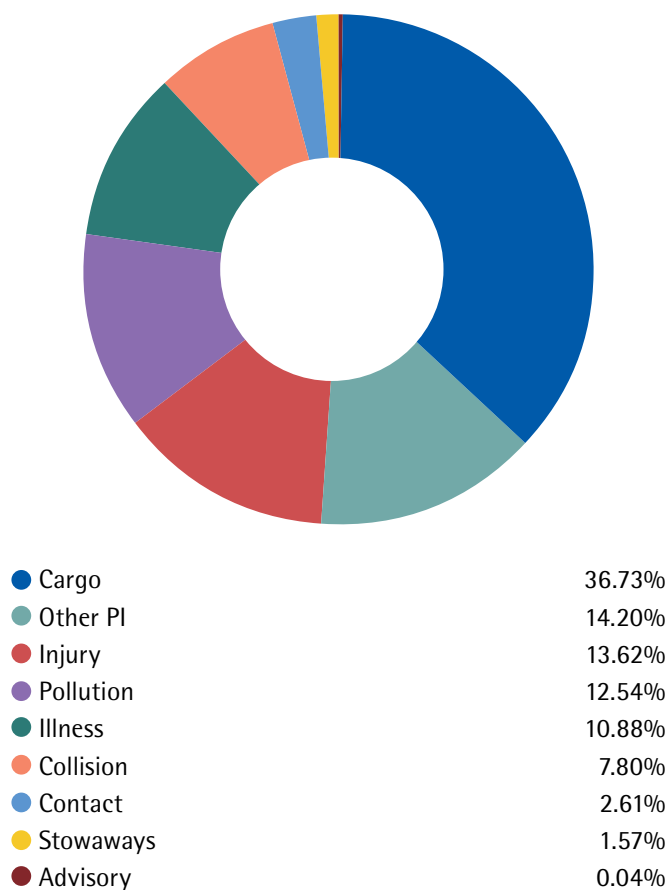
### Graph 4.5: Claims cost in % Claims 5,000–3,000,000 (USD)

Period: 2005-2014

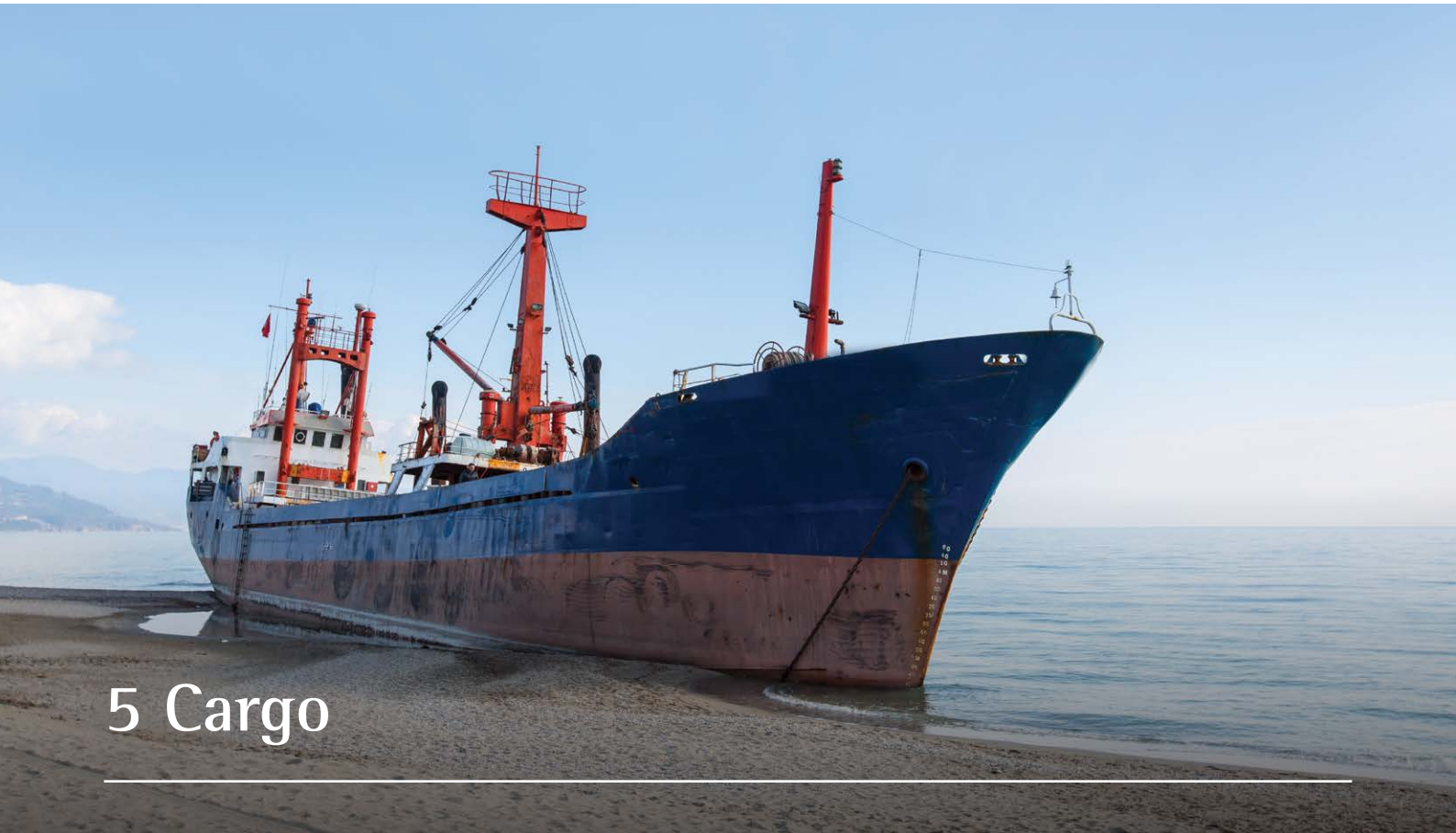
Types of vessel: Bulk carriers, containers and tankers

Types of claims: All claim categories

As per 25/9/2015



Graph 4.5 shows the cost when claims are capped at USD 3,000,000. If uncapped the cost for 'Other PI' will have the largest share.



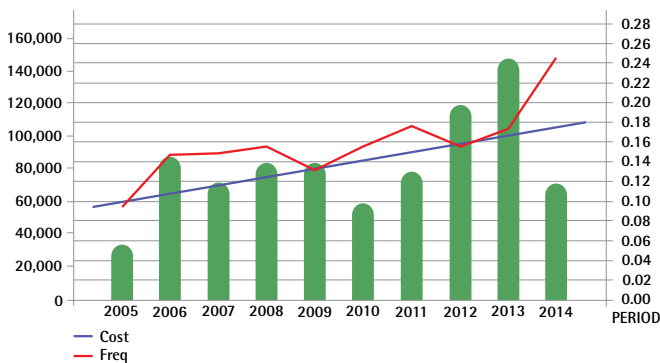
# 5 Cargo

## 5.1 Introduction

We can see from Graph 5.1 that the average cargo claims cost across all three vessel types is more than USD 100,000 over the past ten years. Costs fell in 2014 but the frequency continued to rise. There has been an overall rise in frequency over the past 10 years but that rise is seen for claims above USD 5,000 which indicates that the claims costs are rising.

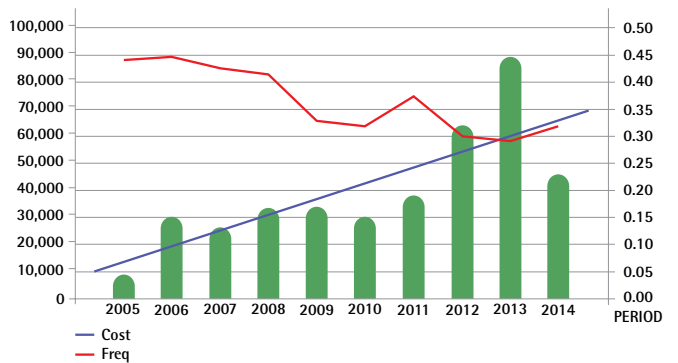
**Graph 5.1: Average claims costs & frequency Claims 5,000–3,000,000 (USD)**

Period: 2005 - 2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Cargo  
 As per 25/9/2015



**Graph 5.2: Average claims costs & frequency Claims 1–3,000,000 (USD)**

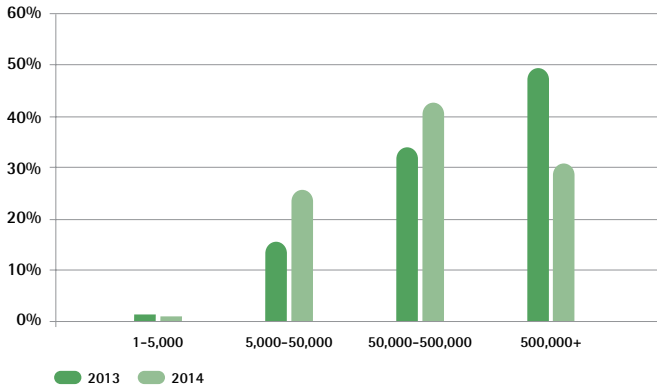
Period: 2005 - 2014  
 Types of vessel: Bulk carriers, containers, tankers  
 Type of Claim: Cargo  
 As per 25/9/2015



The frequency for claims above USD 5,000 is rising. Graph 5.1 shows that over the past ten years the frequency and cost increased constantly. Graph 5.2 shows however that the frequency for claims below USD 5,000 is falling.

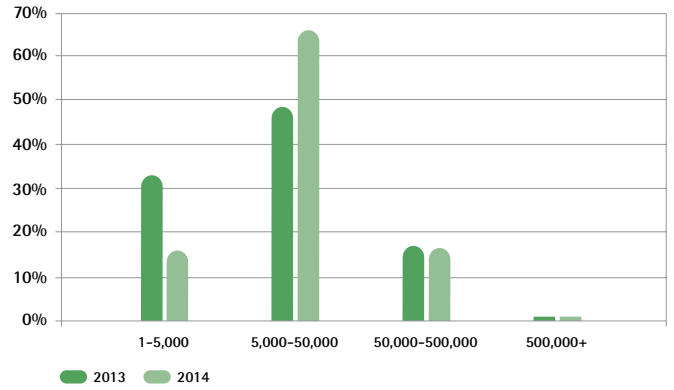
**Graph 5.3: Cargo – Distribution of cost (USD) 2013-2014**

Period: 2005 - 2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Cargo  
 As per 25/9/2015



**Graph 5.4: Cargo – Number of claims (USD) 2013-2014**

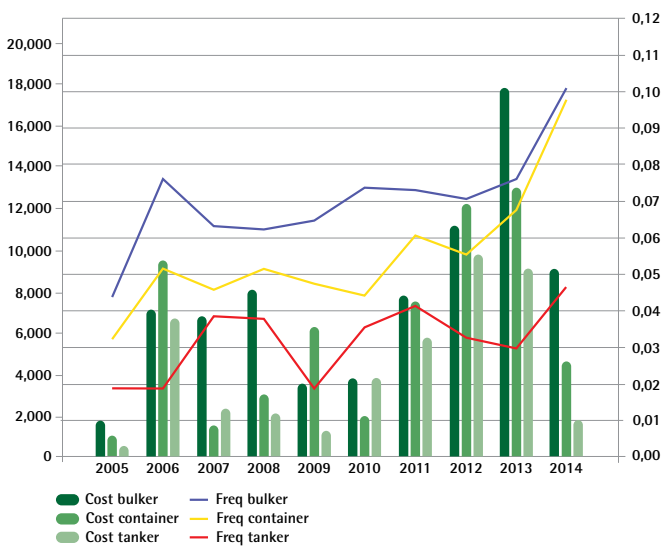
Period: 2005 - 2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Cargo  
 As per 25/9/2015



It is interesting to note that claims in the USD 1-5,000 cost interval fell by almost 50% between 2013 and 2014. Those in the USD 5,000-50,000 cost interval rose by around 30%. There are only about 1% of expensive claims above USD 500,000 but this is 50% of the overall cost for 2013 and 30% for 2014.

**Graph 5.5: Claims costs and frequency per type of vessel Claims 5,000–3,000,000 (USD)**

Period: 2005 - 2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Cargo  
 As per 25/9/2015



Graph 5.5 highlights the increase in frequency for cargo claims on all types of vessel. The combination of expensive cargo claims and an increase in frequency is a worrying trend. Managers must prioritise the implementation of preventative measures within the company.

Costly cargo claims are often due to catastrophic claims like total losses, fires or navigational claims, which we define as collisions, contact or groundings.

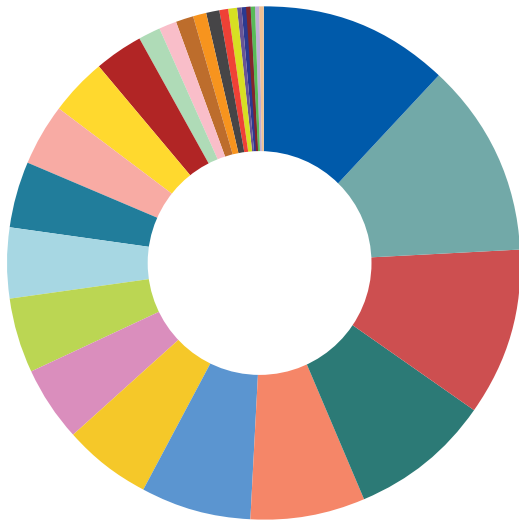
Fortunately, these claims are not frequent as we can see from Graph 5.7, but when they do occur the consequences are severe as per Graph 5.6.

See [Appendix \(i\)](#) for further information on ship fires and how to prevent them.

Apart from catastrophic claims, the most expensive cargo claims are contamination. This means that cargo was contaminated or not in a proper condition when loaded, which is usually defined as an inherent defect or water leaking through cargo hatches.

**Graph 5.6: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005-2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Cargo  
 As per 29/9/2015



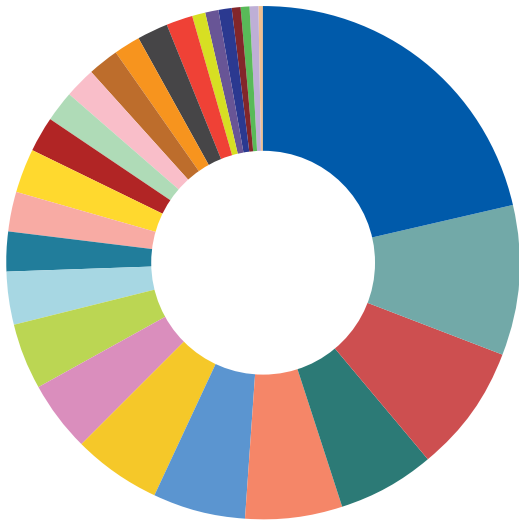
● Inherent vice	12.22%
● Collision	12.07%
● Grounding	10.58%
● Improper cargo handling, shore-side	8.83%
● Improper cargo handling, shipside	7.15%
● Fire	7.02%
● Heavy weather	5.72%
● Flooding of hold	4.66%
● Insufficient cleaning	4.58%
● Leaking hatch covers	4.56%
● Damage prior to loading	4.03%
● Leaking vents	3.91%
● Multiple causes	3.65%
● Poor tally	3.20%
● Poor stowage	1.43%
● Damage post discharge	1.11%
● Leaking pipes	0.97%
● Reefer mechanical failure	0.84%
● Poor monitoring/maintenance of reefer unit	0.76%
● Leaking container	0.58%
● Insufficient lashing/securing, shipside	0.49%
● Leaking cargo	0.42%
● Insufficient lashing/securing by stevedore	0.41%
● Insufficient lashing/securing by shipper	0.38%
● Loading heavy containers on top of light	0.25%
● Blocked bilges	0.17%
● Contact	0.02%

The top three most expensive categories are inherent vice, collision and grounding. Inherent vice is caused because the cargo is not in proper condition when it is loaded. This emphasises the importance of having proper testing procedures to ensure the cargo is within the specifications. Cargo claims caused by collisions and groundings show how catastrophic claims will have a ripple effect. The reasons and preventative measures to why collisions and groundings occur can be found in our publication: **Navigational Claims**.



**Graph 5.7: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Cargo  
 As per 29/9/2015



● Improper cargo handling, shore-side	21.40%
● Improper cargo handling, shipside	9.47%
● Poor tally	8.23%
● Damage prior to loading	6.17%
● Heavy weather	6.04%
● Flooding of hold	5.90%
● Multiple causes	5.35%
● Leaking hatch covers	4.39%
● Insufficient cleaning	4.25%
● Inherent vice	3.29%
● Poor monitoring/maintenance of reefer unit	2.61%
● Reefer mechanical failure	2.61%
● Damage post discharge	2.61%
● Leaking container	2.33%
● Poor stowage	1.92%
● Collision	1.92%
● Insufficient lashing/securing by shipper	1.92%
● Insufficient lashing/securing by stevedore	1.78%
● Leaking vents	1.78%
● Grounding	1.65%
● Fire	0.82%
● Insufficient lashing/securing, shipside	0.82%
● Leaking pipes	0.82%
● Leaking cargo	0.69%
● Loading heavy containers on top of light	0.55%
● Blocked bilges	0.41%
● Contact	0.27%

The most frequent claims are for improper cargo handling, usually caused by procedures not being followed. To prevent this, crews need to monitor cargo operations and collect evidence of any damage to the cargo that occurs. Having proper testing procedures will most likely prevent future cargo claims.

## 5.2 Bulk carriers

### 5.2.1 Statistics

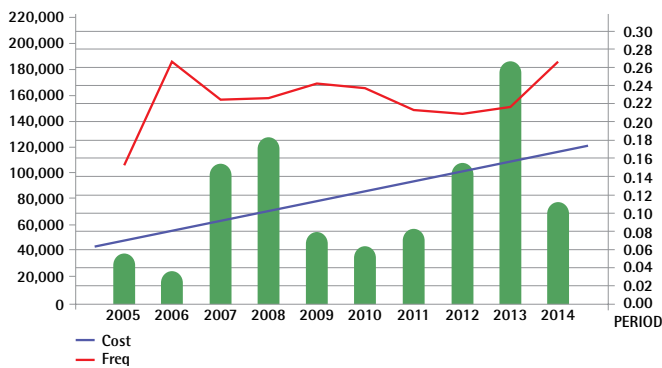
Of the three types of vessel, bulk carriers recorded the highest average claims costs and also the highest frequency of claims over the past ten years.

The top 10 most expensive claims over the past 10 years were in the following claims categories:

1. Inherent vice
2. Grounding
3. Collision
4. Leaking vents
5. Insufficient cleaning
6. Damage prior to loading
7. Unknown
8. Poor tally
9. Flooding of hold
10. Unknown

**Graph 5.8: Average claim cost and frequency  
Claims 5,000–3,000,000 (USD)**

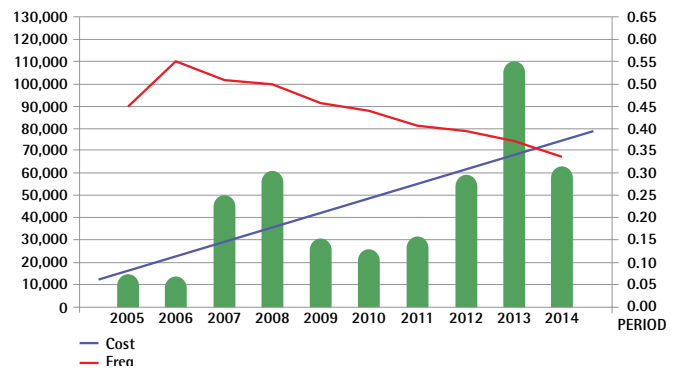
Period: 2005 - 2014  
Type of vessel: Bulk carriers  
Type of claim: Cargo  
As per 30/9/2015



The frequency for claims above USD 5,000 is rising.

**Graph 5.9: Average claims costs and frequency  
Claims 1–3,000,000 (USD)**

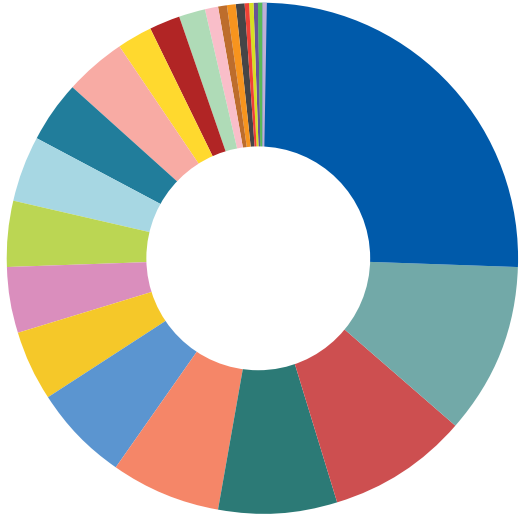
Period: 2005 - 2014  
Type of vessel: Bulk carriers  
Type of claim: Cargo  
As per 30/9/2015



The frequency for claims below USD 5,000 is falling.

**Graph 5.10: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Type of vessel: Bulk carriers  
 Type of claim: Cargo  
 As per 30/9/2015

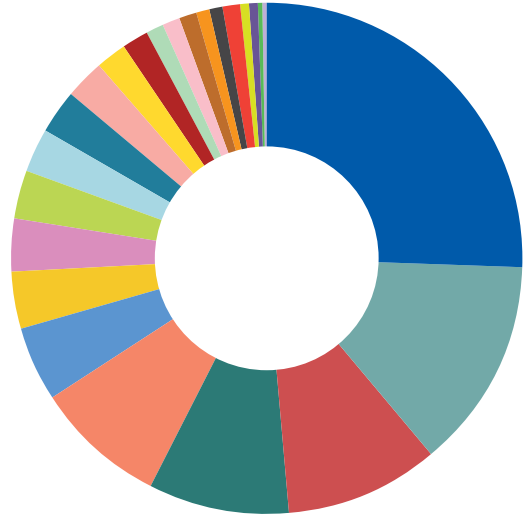


● Inherent vice	25.70%
● Improper cargo handling, shore-side	10.87%
● Grounding	8.77%
● Leaking hatch covers	7.62%
● Poor tally	6.77%
● Damage prior to loading	6.17%
● Insufficient cleaning	4.47%
● Multiple causes	4.33%
● Improper cargo handling, shipside	4.08%
● Collision	4.08%
● Leaking vents	4.05%
● Heavy weather	3.72%
● Flooding of hold	2.41%
● Leaking pipes	1.93%
● Poor stowage	1.44%
● Damage post discharge	0.90%
● Fire	0.70%
● Insufficient lashing/securing, shipside	0.45%
● Error in calculation	0.44%
● Insufficient lashing/securing by stevedore	0.43%
● Blocked bilges	0.41%
● Insufficient lashing/securing by shipper	0.13%
● Leaking cargo	0.10%
● Contact	0.01%

The most costly immediate cause is inherent vice which is mainly caused by not checking cargo properly before loading.

**Graph 5.11: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Type of vessel: Bulk carriers  
 Type of claim: Cargo  
 As per 30/9/2015



● Improper cargo handling, shore-side	25.68%
● Poor tally	13.38%
● Leaking hatch covers	9.76%
● Damage prior to loading	8.68%
● Improper cargo handling, shipside	8.32%
● Multiple causes	4.88%
● Insufficient lashing/securing by stevedore	3.62%
● Inherent vice	3.25%
● Heavy weather	3.07%
● Leaking vents	2.89%
● Poor stowage	2.71%
● Flooding of hold	2.35%
● Damage post discharge	1.99%
● Leaking pipes	1.63%
● Blocked bilges	1.27%
● Insufficient cleaning	1.08%
● Insufficient lashing/securing, shipside	1.08%
● Grounding	0.90%
● Insufficient lashing/securing by shipper	0.90%
● Error in calculation	0.90%
● Collision	0.72%
● Fire	0.54%
● Contact	0.18%
● Leaking cargo	0.18%

The most common immediate cause is improper cargo handling, which also emphasises how important it is for crews to monitor entire cargo operations to secure as much evidence as possible about damaged cargo.



### 5.2.2 Bulk carrier cargo claims

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. It can be difficult for a shipowner to prevent this from happening, so detailed records should be kept on board showing that best practices have always been followed during loading, transit and discharge.

The most common claims in this category are shortage and wet damage.

Contamination is an expensive claim category on bulk carriers; the claims are not very frequent but when they occur they are quite severe.

**Wet damage** – mainly caused by:

- Improper cargo handling shipside
- Improper cargo handling shore-side
- Cargo being 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 being properly calculated
- Incorrect cargo handling shipside or shore-side

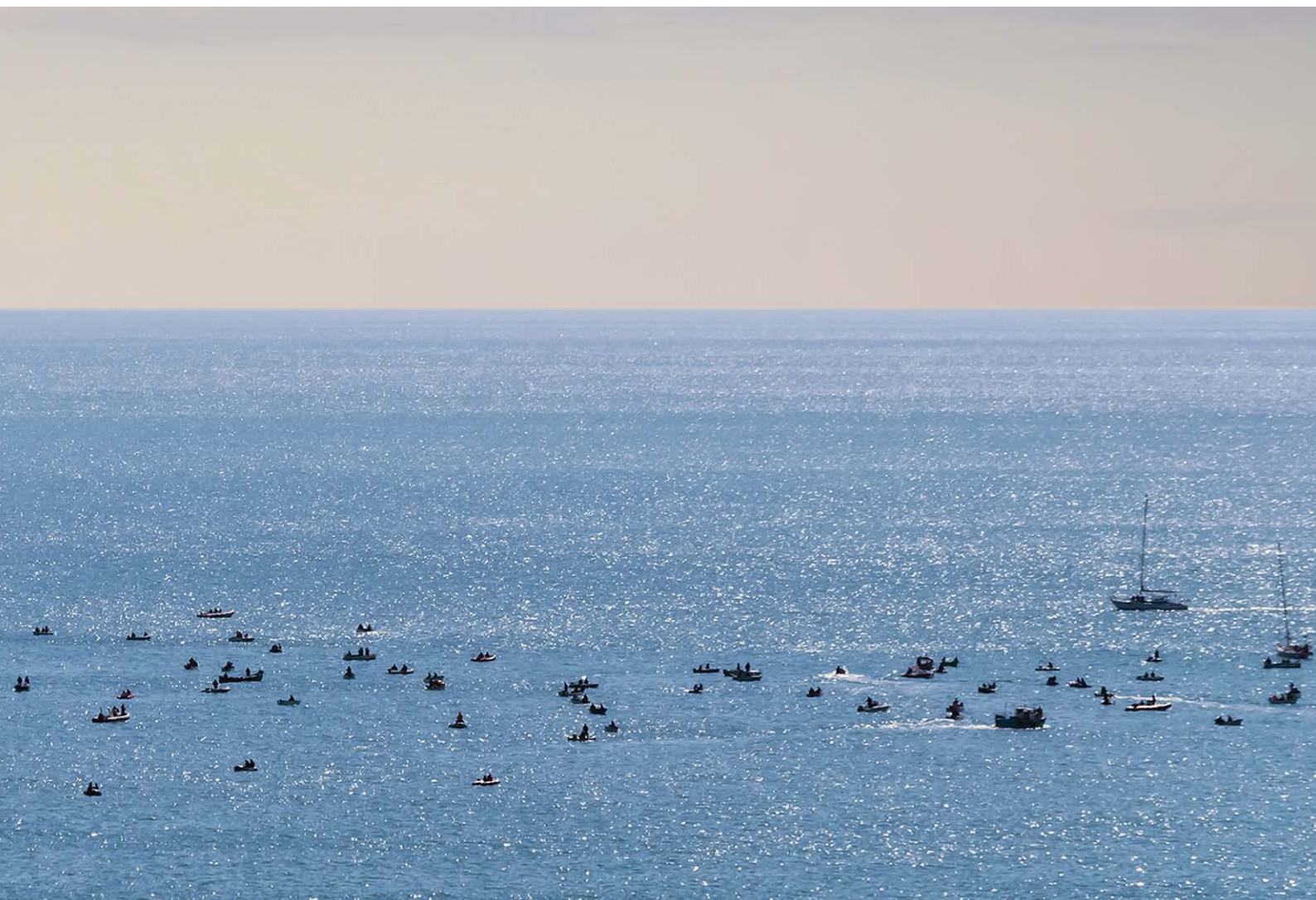
**Contamination** – mainly caused by:

- Improper cargo handling shipside
- Improper cargo handling shore-side
- Inefficient cleaning prior to loading
- Poor maintenance of cargo holds
- Mixing of incompatible cargo
- Cargo being contaminated or high moisture content prior to loading
- Inherent vice

**Concerns on bulk carriers**

- Leaky hatch cover (coamings/rubber seals).
- Heat damage.
- Contamination (cargo hold cleaning).
- Shortage (common depending on cargo and geography).





- Maintenance of sounding and vent pipes.
- Liquefaction.
- Inherent defect.
- Flooding of cargo holds (manhole covers for ballast and bunker tanks not secured correctly after yard visit).

### 5.2.3 Case studies

#### Wet damage

##### Wet damage case study 1

The bulk carrier was carrying coal. While at the discharge port the vessel had to ballast cargo hold 2 to stay within the quay's air draft requirements. The water in cargo hold 2 was drained into one of the ballast tanks and then washed down.

The vessel had two pumps, which were used when cargo hold 2 was washed down. Shortly afterwards the stevedores noticed patches of water in cargo hold 1 and informed the Master immediately. One hour later the Master stopped the cargo operation, by which time the water level had risen to five metres.

#### Causes:

The crew started to search for the origin of the leak and the bilge system was pressurised, all valves were closed and it became obvious that several valves were leaking, because water had entered the cargo hold through the bilge wells. Some valves, indicated as closed on the ballast console panel, were in fact open, which was caused by a faulty switch. No previous testing or maintenance had been carried out on the bilge system. The malfunction of the valves was likely caused by corrosion, which could have been aggravated by cargo residue as the vessel had been carrying coal on its three previous trips.

The company's internal investigation concluded that the incident was caused by the deteriorated condition of the valves in combination with a faulty switch.

#### Wet damage case study 2

The bulk carrier was a newbuild and it was the vessel's first voyage after delivery. The vessel was loaded with wheat. During the voyage the vessel experienced heavy weather,

up to force 10. The heavy weather lasted for a couple of days causing the vessel to pitch and roll heavily. Afterwards the crew carried out tank soundings. All cargo hold bilges reportedly showed a maximum sounding of about 5cm in the bilge well, whereas all topside water ballast tanks were empty. The cargo hold bilges were not equipped with a bilge high-level alarm system.

During good weather the Chief Officer opened up the cargo hatches to inspect the condition of the wheat for any signs of water ingress following the ship's earlier heavy weather encounter. None was observed to the surface of the cargo situated below the hatch cover coaming and hatches. However, following closer inspection, the Chief Officer reportedly discovered that a section of the wheat situated just below the overboard discharge pipeline outlet of the topside water ballast tank had become wet. The pipeline, leading into the said water ballast tank was also wet. The Chief Officer checked the ballast tank and it was empty. He observed that any water filled into the ballast tank would leak into the cargo hold.

#### Causes:

The gap between the outer circumference of the section of pipe to the inner side of the sleeve was noted up to about 2mm. It was found that this gap was not welded when

compared to the same top section of the other overboard discharge pipelines. The shipyard had missed welding the pipe and this was not noticed prior to delivery.

## Contamination

### Contamination case study 1

The bulk carrier was discharging grain. After almost half of the cargo hold had been emptied some caked cargo was found. The cargo in the immediate vicinity of two pipes at the aft bulkhead of the hold was wet and a strong oily odour was detected. The cargo receiver refused to accept the cargo and claimed that all cargo now was unfit for human consumption.

#### Causes:

After an investigation by the crew it was found that fuel oil vapour from one of the fuel tanks had leaked from a broken air vent and sounding pipe. This caused oil to enter the cargo hold resulting in the contamination.

### Contamination case study 2

The bulk carrier had loaded wheat. Upon discharge it was found that the cargo smelled of fuel oil. The smell had entered the cargo hold through the air ventilation pipe of the fuel oil tank.





## Causes:

It was found that the smell came from the air ventilation pipe of one of the fuel oil tanks. A hole had been detected in the pipe so the crew put plastic and tape around the damaged area and considered this to be repaired.

## Heavy weather

### Heavy weather case study 1

The bulk carrier had loaded corn, and after loading was complete all cargo hatches were sealed with Ramnek tapes and underwent a water hose test and cleanliness inspection by the surveyor, which they passed.

During the voyage to the discharge port the vessel encountered heavy weather, up to force 10, which caused the vessel to pitch and roll heavily for a couple of days. When the vessel arrived at the discharge port it was discovered that the top surface of the cargo was wet, caked and mouldy.

## Causes:

An external surveyor at the discharge port inspected the cargo hatch covers, paying particular attention to rubber gaskets, closing devices, non-return valves, ventilators, hatch access, double drainage channels etc. All were visually found to be in good working order. However, traces of seawater were found on the inner hatch coaming. An ultrasonic test was conducted on the affected hold and it was found that the cross joints, between forward and aft hatch panels, had leaked. It was also found that there was no contact between compression bars and rubber gaskets on the cargo hatches cross joint panel. The cargo had suffered damage from the leaking cargo hatch covers.

### Heavy weather case study 2

While the bulk carrier was loading soybeans it rained frequently. The Master stated that the hatch covers were closed before the rain commenced. The vessel was weather routed but still ended up sailing through heavy weather, up to force 10. The vessel was rolling and pitching heavily and the deck and cargo hatches were covered in seawater. During the passage the vessel's bilges were checked twice a day and found to be dry. In the discharge port it was found that the top layer of cargo was mouldy.

## Causes:

The marine sealing tape was damaged in the heavy weather so the Master submitted a sea protest to the authorities in the discharge port. It was found that the cargo hatch cover had leaked.

## Heat damage

The Club has experienced several claims of cargo damage caused by heating of bunker fuel in bunker tanks adjacent to cargo holds.

The types of vessel most at risk are bulk carriers. It is important to know that in specific conditions cargo can suffer heat damage at temperatures as low as 40-50°C. Furthermore, cargo loaded in the most aft cargo hold might be exposed to excessive heat if service and settling tanks are adjacent to the cargo hold as these tanks will reach temperatures of about 90°C. If sensitive cargo is loaded in the aft cargo hold the crew must plan so the cargo does not suffer heat damage.

Bunker fuel can also be stored in the double bottom tanks beneath the cargo hold, and this will radiate heat to the tank top. A warm tank top or bulkhead surface might cause the cargo to become discoloured, caked, carbonised, mouldy and at worst, even to self-ignite. Other factors that will contribute to the damage include the moisture content of the cargo at loading port, ventilation of cargo hold during the voyage and condensation due to external temperature.

Some cargoes, which are sensitive to heat include soybean, maize, wheat and sunflower seeds. Note that soybeans can be damaged at temperatures as low as 40°C.

The best prevention is to have procedures in place controlling how bunker tanks should be heated. Crews need to know at what temperature cargo becomes damaged and to keep detailed records of what has been carried out during loading, sailing and discharge. It is important to prove that best practices have been followed.

If best practices have been followed then it is probable that the cargo was not in a proper condition when it was loaded and it is unlikely that heating the bunker caused the damage. The better and more detailed the records are then the easier it is to determine the cause of the damage.

### Heat damage case study 1

The bulk carrier had loaded wheat and during discharge it was found that some of the cargo was damaged in cargo holds 2 and 3. The cargo receiver claimed that the cargo was heat damaged. The top layer of the cargo was in the proper condition in both cargo holds. During the voyage heavy fuel oil tanks had been heated. Some of the cargo by the aft bulkhead of cargo hold 2 had been discoloured and there was also a burning smell. Behind this bulkhead were heavy fuel oil tanks. In cargo hold 3 there was some damaged cargo in the aft part. The settling tanks were adjacent to the cargo hold bulkhead. There was no cofferdam between the service/settling tanks and cargo hold. These tanks were heated in excess of 80°C.

### Heat damage case study 2:

The bulk carrier had loaded wheat and at time of discharge the top layer of the cargo was found to be in good condition. However, cargo at the aft bulkhead, adjacent to the engine room was damaged. The damaged cargo was dry and caked. It could not be established what the exact temperature of the bunker fuel had been.

### Heat damage case study 3:

The bulk carrier had loaded sunflower seed meal, with burned cargo found by the aft bulkhead adjacent to the engine room during discharge. Subsequently, heavy fuel oil tanks in the engine room were in direct contact with the aft bulkhead. The surveyor was unable to find records showing what temperatures the heavy fuel oil had been heated to.

### Heat damage case study 4:

The bulk carrier had loaded soybean meal. Loading had been interrupted several times due to rain. On completion of loading the cargo was fumigated. During the voyage the vessel had experienced some heavy weather. Upon discharge mouldy cargo was found in the top layer. Furthermore, some heat damaged cargo was found by the aft cargo hold bulkhead, adjacent to a heavy fuel oil tank. During the voyage this tank was heated to 60°C.

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## Alleged heat damage

Inspection of casualties where the owner has been blamed for causing heat damage to the cargo have shown that it is more likely that the cargo was not in proper condition when loaded. The shipper had not ensured that the cargo was properly prepared for shipment. This emphasises the importance of crews keeping good records to prove that all procedures were followed.

### Alleged heat damage case study 1

The bulk carrier had loaded bagged parboiled rice in a Southeastern Asian port. During loading the moisture content of the rice was very close to the allowed limit. The sea temperature in the port was 32°C. When loading was complete the cargo holds were fumigated with phosphine. The cargo holds were under gas for the first four days of the voyage and then the hatch covers were opened and ventilated as per best practices. The fuel in the double bottom bunker tanks, below cargo holds 3, 4 and 5, registered a temperature of 29°C during the voyage.

During discharge it was found that some cargo had become discoloured. Some moisture damage and caking

to the rice was also reported. The double bottom tanks for cargo holds 2, 3, 4 and 5 were subdivided into ballast and fuel oil tanks. The cargo receiver accused the vessel of excessively heating bunker fuel.

Excessive temperatures can lead to non-enzymic browning, which can cause discolouration in rice cargo. It is important to know the temperature and moisture levels when deteriorative changes occur in milled rice. It seems that non-enzymic browning, such as the Maillard reaction, requires temperatures above 60°C. In this case the recorded cargo temperatures were within normal parameters for this trade. These temperatures would not cause discolouration or browning.

The damage caused to the rice is more likely because of pre-shipment temperature abuse or a problem inherent in the rice. Caking of bags was caused principally by condensation in the vessel, which was aggravated by an inherently high moisture content in the rice. The moisture content caused the rice to become microbiologically unstable, and as such, unsafe for shipment, a factor that undoubtedly led to localised spoilage in random areas, as was the case of this cargo.

The claim was settled and it was determined that heating of the bunker fuel was not the cause of the cargo damage, but the inherent moisture content of the rice before loading.

### Alleged heat damage case study 2

The bulk carrier had loaded yellow corn in southern USA. During the voyage the crew measured the temperature and ventilated the cargo holds. The vessel also experienced two days of heavy weather, registering force 8, and seas covering the cargo hatches. Damaged cargo was found on the top layer when the cargo hatches were opened during discharge and was found to be mouldy and discoloured. This was similar for almost all cargo holds. At the end of discharge some damaged cargo was found on the tank top. The cargo receiver claimed that the vessel had excessively heated the bunker fuel. The temperature of the bunker fuel had never been above 40°C according to the Chief Engineer. Loading was stopped at the loading port about seven times because of rain, and could have affected the moisture content of the cargo. Before loading, the cargo should have been dried. In this case it seems that the cargo was not dried before loading. Major differences were also recorded between night and day temperatures at the loading port, which can cause condensation in the cargo hold. The cargo was also loaded almost to the cargo hatch cover, so there was no air circulation in the hold. The claim was settled and the accusation that damage was caused by heating bunker fuel was dismissed.



### 5.2.4 Self-heating

In some cases self-heating can lead to a fire, but this is relatively uncommon. Vigilance and good working practices when loading are the key to fire prevention of this kind of cargo; this should extend to any hot work carried out near part filled or full cargo holds. Self-heating in cargo such as coal, can potentially lead to a fire. By far the most effective means of preventing such fires is to rigorously adhere to the requirements of the International Maritime Solid Bulk Cargoes Code (IMSBC) during and after loading.

### 5.2.5 Hatch covers

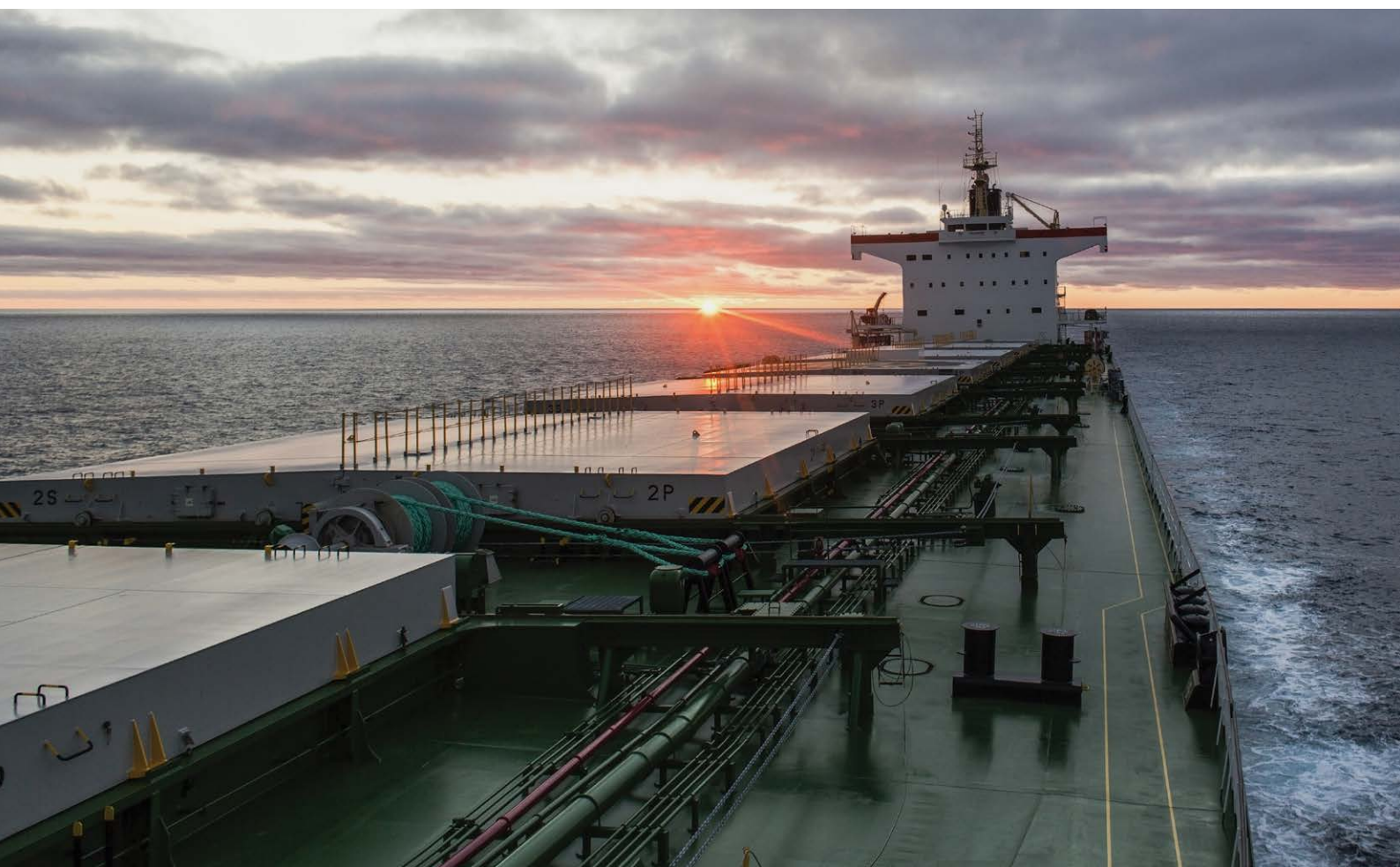
A great deal of cargo damage on bulk carriers is caused by leaking hatch covers, particularly when vessels encounter heavy weather. To prevent this, weather conditions must be monitored very carefully so that severe weather can be avoided. Leaking hatch covers are unfortunately causing lots of wet damage claims.

One of the most common tests prior to loading to ensure that cargo hatches are not leaking, is the water hose test. The crew put fire hoses under pressure and spray the hatches. Unfortunately, it seems that the hose test is of little value for ensuring proper sealing on a vessel at sea. It is possible that the Master can obtain an indication of the

condition of the transverse joints, but the horizontal seals on the coaming are far more difficult to address. It is quite obvious that the pressure of the sea on the covers cannot be simulated using a fire hose.

It is more effective to use an ultrasonic device, which is designed for this purpose. The advantages of using this type of equipment are evident, since sealing tests can be carried out in a loaded condition without risking cargo damage and also allow for the possibility of an assessment in sub-zero temperatures.

To address this issue it is important there are SMS (Safety Management System) procedures detailing the checks required to ensure the hatch covers are in a proper condition. It is even more important that these checks are included in the PMS (Planned Maintenance System), in combination with extensive maintenance tasks. It is imperative that there are specific action points regarding the seals, coamings and pads. A risk assessment needs to be in place regarding the different issues concerning leaking hatch covers.



## 5.2.6 Prevention

To monitor if water enters any tank or cargo hold, bulk carriers have a Water Ingress Monitoring System (WIMS).

However the WIMS is a safety requirement and not suitable for cargo monitoring purposes, and so it is therefore important to install a proper bilge alarm in every cargo hold.

This is because the alarm panels for the WIMS are very often on the bridge and linked to the alarm monitoring system in the engine control room. If the WIMS alarm has already been activated because a hold is already filled up it will not trigger the alarm in the engine control room, but will only trigger the alarm on the bridge. If the cargo operation is not being monitored on the bridge there is a major risk that flooding will not be discovered in time. The SMS and PMS should require that the bilge system be inspected before cargo operations commence as per the company's SMS and PMS.

### Prevention for bulk carriers

- Agree on a stowing plan.
- Stow in accordance with the IMSBC code.
- Cargo holds should be 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 and 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.
- Wet cargo or snow/rain during loading will result in high humidity levels inside the holds and should be avoided. 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 are 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, recording;
  - Temperatures in cargo holds.
  - If the cargo holds have been ventilated and for how long.
  - If 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 the vessels' PMS systems.
- 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 the vessel's PMS system.
- A Master has some measure of control over the loading of bulk cargo and can take steps to prevent any fires. The most common causes of fire in agricultural and general product cargo are the careless disposal of smokers' materials, often by stevedores who are notorious for both open and clandestine smoking, and problems with fumigants.
- It is important that a pressure test is carried out after any maintenance carried out on any pipes, otherwise this can cause leaks, which can damage the cargo.
- The PMS and SMS should include procedures ensuring that cargo lights are switched off after cargo operation, because of the substantial risk of overheating

# 5.3 Container vessels

## 5.3.1 Statistics

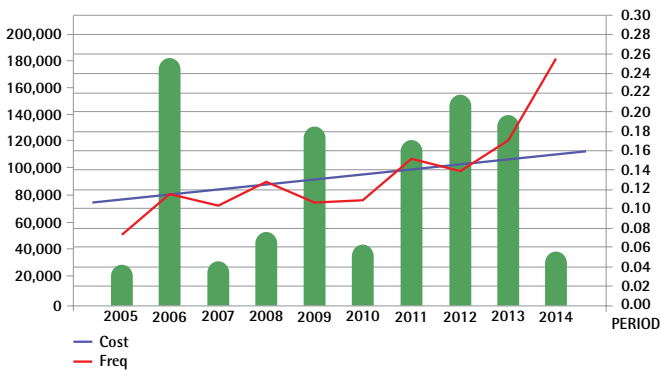
There has been a continuous increase in frequency for container vessels since 2009, and is a concern even though the frequency is not as high as for bulk carriers.

The top 10 most expensive cargo claims over the past 10 years were in the following categories:

1. Collision
2. Heavy weather
3. Grounding
4. Fire
5. Fire
6. Improper cargo handling, shipside
7. Grounding
8. Grounding
9. Flooding of hold
10. Poor stowage

**Graph 5.12: Average claim cost and frequency Claims 5,000–3,000,000 (USD)**

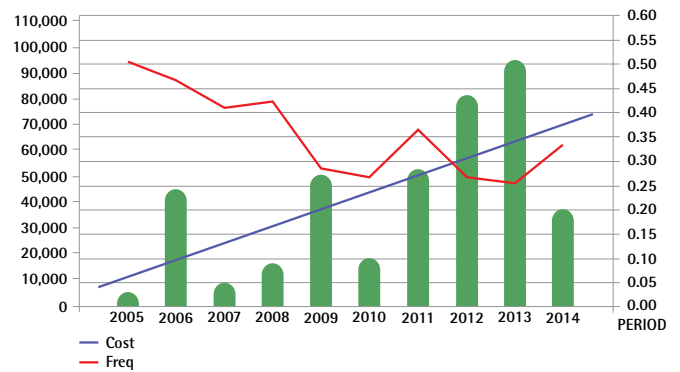
Period: 2005 - 2014  
 Type of vessel: Container  
 Type of claim: Cargo  
 As per 30/9/2015



The frequency for claims above USD 5,000 is increasing.

**Graph 5.13: Average claim cost and frequency Claims 1–3,000,000 (USD)**

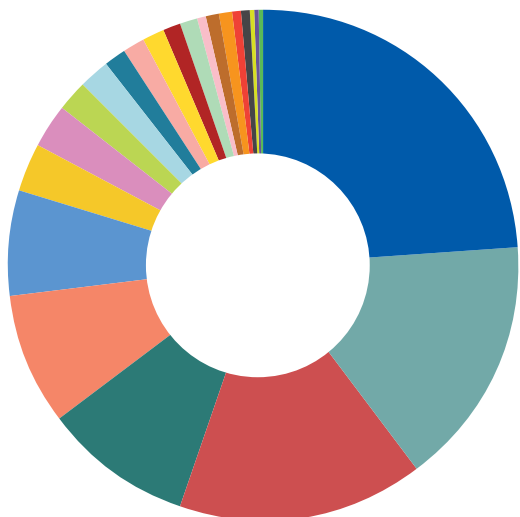
Period: 2005 - 2014  
 Type of vessel: Container  
 Type of claim: Cargo  
 As per 30/9/2015



The frequency for claims below USD 5,000 is decreasing.

**Graph 5.14: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Type of vessel: Container  
 Type of claim: Cargo  
 As per 30/9/2015

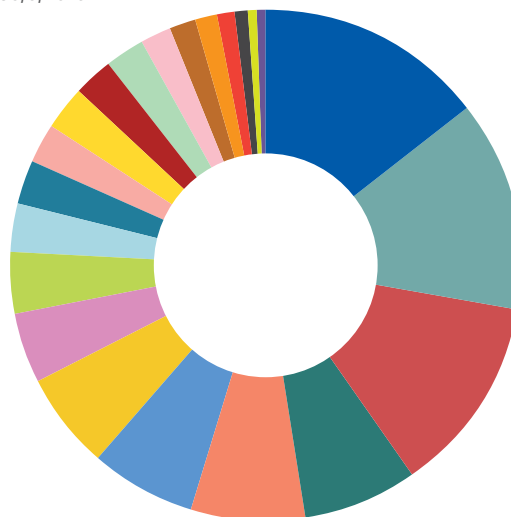


● Collision	24.11%
● Fire	15.80%
● Grounding	15.53%
● Heavy weather	9.53%
● Flooding of hold	8.44%
● Improper cargo handling, shipside	6.57%
● Improper cargo handling, shore-side	2.98%
● Leaking hatch covers	2.79%
● Reefer mechanical failure	1.98%
● Poor monitoring/maintenance of reefer unit	1.79%
● Multiple causes	1.49%
● Poor stowage	1.45%
● Leaking container	1.36%
● Damage post discharge	1.17%
● Inherent vice	0.85%
● Insufficient lashing/securing by shipper	0.78%
● Leaking vents	0.76%
● Insufficient lashing/securing, shipside	0.68%
● Insufficient lashing/securing by stevedore	0.61%
● Loading heavy containers on top of light	0.58%
● Damage prior to loading	0.48%
● Leaking pipes	0.25%
● Contact	0.02%

Catastrophic events like collisions, fires and groundings have caused the most costly claims over the past ten years.

**Graph 5.15: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Type of vessel: Container  
 Type of claim: Cargo  
 As per 30/9/2015



● Improper cargo handling, shore-side	14.50%
● Flooding of hold	13.36%
● Heavy weather	12.60%
● Poor monitoring/maintenance of reefer unit	7.25%
● Reefer mechanical failure	7.25%
● Leaking container	6.49%
● Improper cargo handling, shipside	6.11%
● Insufficient lashing/securing by shipper	4.58%
● Collision	3.82%
● Insufficient lashing/securing by stevedore	3.05%
● Damage prior to loading	2.67%
● Grounding	2.67%
● Leaking hatch covers	2.67%
● Damage post discharge	2.67%
● Inherent vice	2.29%
● Poor stowage	1.91%
● Loading heavy containers on top of light	1.53%
● Fire	1.53%
● Leaking vents	1.15%
● Insufficient lashing/securing, shipside	0.76%
● Leaking pipes	0.76%
● Contact	0.38%

The most common claims include improper cargo handling and water entering the cargo hold by either pumping water into the cargo hold or leaking through hatch covers.





### 5.3.2 Container vessel cargo claims

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

For more information about preventative measures regarding navigational claims please refer to our *Navigational Claims* publication.

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 shore-side
- Heavy weather

**Wet damage** – mainly caused by:

- Leaky cargo hatches
- Flooding of holds
- Pipes and valves in poor condition

**Concerns on container vessels**

- Not securing containers as per the cargo manual
- Charterers' loading plan is not as per the vessel's cargo plan
- Cargo manifest is not correct and does not include all cargo covered under the International Maritime Dangerous Goods Code
- Reefer containers need to be monitored during the voyage because small changes in the temperature can ruin the cargo

- Crews ignoring bilge alarms in the cargo holds
- Bilge alarms not maintained and tested properly
- Not avoiding heavy weather
- Excessive speed in heavy weather

### 5.3.3 Case studies

#### Wet damage

The average claim cost for wet damage on container vessels is significantly higher than the average cargo claim. As we can see below, the usual causes are leaking – pipes, valves and manholes – but also ballast lines, which have become corroded, cracks in ballast tanks and cases where bilge alarms have been ignored causing water to enter the cargo hold. These issues occur mainly because crew members have ignored procedures or they have not carried out proper maintenance on pipes, valves and pumps. There are other occasions when the bilge pumps have been full of debris, indicating that the systems have not been properly tested and maintained.

Leaking manholes from either ballast or bunker tanks are also a recurring problem, causing cargo hold flooding. This is common after a yard visit or scheduled tank inspection, when tank inspections have been carried out. It is essential that crews are aware of this greater risk and ensure that all manholes are secured.

It is essential that the company reviews its cargo procedures and addresses these issues.

### Wet damage case study 1

The Chief Officer decided to carry out a routine ballast tank inspection for several tanks. The Chief Officer completed a permit for entry into confined/enclosed spaces and also an initial risk assessment for entry into enclosed spaces. The company had a requirement for carrying out detailed risk assessments but no specific requirement as to when this should be done. In this case, the officers did not think it was necessary.

The following day the vessel berthed and cargo operation commenced. The vessel carried out a normal ballast operation and sailed for the next port in the evening.

About 24 hours after the ballast operation had been completed, the Chief Officer discovered that one of the cargo holds had been flooded with more than one metre of water. Prior to this there had been scheduled inspections but they had failed to discover any water.

#### Causes:

It was found that a gasket for the manhole was missing allowing water to enter the cargo hold. According to the company's SMS it was the Chief Officer's responsibility to verify that the hatch is properly secured when work is completed. The vessel was fitted with both cargo hold bilge alarms and high-level alarms. These alarms did not work and no alarm was received on the bridge.

The bilge sensor was broken and heavily corroded. It had been inspected a couple of days previously and found to be in good condition. The inspection had not been completed correctly. After departure an ocular inspection had been carried out but no water had been found.

### Wet damage case study 2

The container vessel was in port discharging cargo and the vessel carried out ballast operations. The Second Officer came on watch at midnight, and during a routine inspection saw that there was water in one of the cargo holds. No bilge alarm was reported in the engine control room or bridge. He told the able seaman (AB) on watch to investigate. The AB found that there was 15 cm of water in the cargo hold. The Second Officer pumped out the water using the bilge pump.

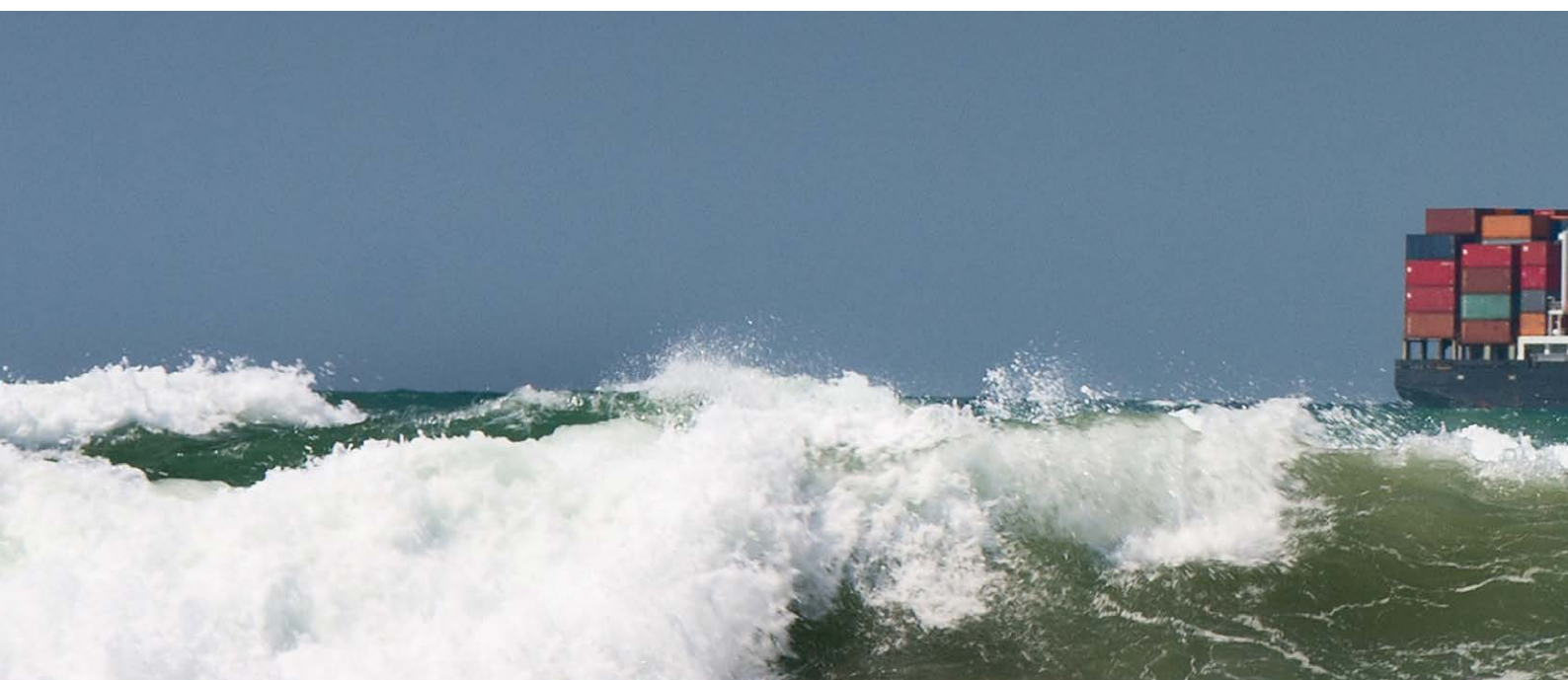
#### Causes:

After discharge was complete water was found leaking out of one of the manholes leading to a ballast tank. The nuts were found to be slack. It was also found that maintenance of the bilge sensors had not been completed as per the PMS. This was because the Chief Engineer could not find any manuals, so had checked the jobs off as complete when they had, in fact, not been completed.

### Wet damage case study 3

The crew washed the deck with fire hoses, and as the fire line was used for the wash down, both fire pumps in the engine room were activated. The crew closed all valves delivering seawater to the anchors in order to get higher water pressure. These valves are usually left permanently open. When they interrupted washing they left the valves closed and the fire pumps working.

The vessel arrived in the port in the evening and cargo operations commenced in the morning. After a while stevedores noted water in one of the cargo holds. The crew investigated and found 20cm of water in the cargo hold.



### Causes:

The Chief Engineer informed the Master that the "bilge water high level" alarm had been activated several times, that the duty engineer had acknowledged the alarm, but had not investigated the cause or informed anyone else. The engineer thought the alarm was due to rain. Why he did not investigate was unclear.

It was found that the water from the wash down had leaked into the void spaces adjacent to the cargo holds. The void space next to the affected cargo hold had an opening connecting it to the cargo hold. The void spaces had no bilge alarm indicating water presence and when the void space was full, water poured into the cargo hold. The water pressure damaged the rubber gaskets placed between the pipelines' flanges and started to flood other void spaces. The water then filled the void spaces adjacent to the cargo hold and once water reached the level of the lower edge of manholes (openings) in longitudinal bulkheads, it started to flood the hold.

### Wet damage case study 4

The container vessel carried out a normal ballast operation. Suddenly, a large volume of water flooded the cargo hold. It was found that a ballast pipe was damaged. The pipe was actually inside the cargo hold so there was no void space protection. The pipe and the surrounding area were heavily corroded. More than 10 containers were damaged. The bilge well alarm didn't work and there was no audible or visual alarm on the bridge alarm panel. Bilge alarms were only visible on the bridge and not in the engine control room.

### Causes:

The water flooding was from a broken ballast water pipe, which was heavily corroded. Once again the bilge well alarm didn't work.

### Wet damage case study 5

The container vessel was at sea and the Chief Officer told the Bosun to carry out a ballast tank inspection. The Bosun completed the inspection with an AB. They secured the manhole and told the Chief Officer that all was satisfactory in the tank. The day after, the Chief Officer began to ballast the tank. A couple of hours later the AB on watch reported that there was water in the cargo hold.

### Causes:

It was found that the nuts of the ballast tank manhole had not been tightened correctly, causing water to pour out.

## Contamination

### Contamination case study 1

The Chief Officer wanted to inspect some of the ballast tanks. He prepared the required checklist for inspection and then gave it to the Bosun who took an AB with him and then proceeded to the cargo hold to open the tank manhole for inspection. The Bosun opened the manhole on one side and the AB on the other side to save time. The AB started to remove the bolts for the manhole that he assumed were for the ballast tank, he removed all the bolts. The Bosun had no problem opening the manholes on his side. Suddenly the Bosun heard a cry from the other side and realized that something





was wrong. He ran over to the other side and saw that the AB was drenched in heavy fuel oil and that oil was pouring onto the deck in the cargo hold, contaminating the containers. The Bosun helped the AB to close the manhole and reported the accident to the Chief Officer.

#### Causes:

The AB had not read the markings properly, which were welded into the manhole and clearly stated that the manhole lead to a fuel tank. The AB removed all the bolts for the manhole and then removed the manhole. When oil started pouring out of the tank it was impossible for the AB to close the manhole himself. The AB did not verify that he was opening the correct tank.

## Heavy weather

### Heavy weather case study 1

The container vessel received reports of anticipated heavy weather but was unable to avoid it. The vessel was maintaining 15 knots with 4m waves in a force 8, causing the vessel to roll 30° at times. 11 containers came loose and were lost overboard, with another 12 containers suffering damage, but not lost overboard. The Chief Officer said the containers were secured as per the cargo securing manual and that they were also checked every day.

#### Causes:

It was not determined, but it is likely that rolls of more than 30° caused some of the cargo in the containers to shift. It is also possible that the lashing rods lost tension due to the vessel's movement, causing containers to move in the same sequence as the vessel and making the twist locks to crack. The vessel did not slow down in time and 15 knots of speed in heavy weather can cause serious damage.

### Heavy weather case study 2

The container vessel encountered heavy weather conditions with force 9 storms and more than 4m of swell. The vessel was rolling and pitching heavily and sea water covered the deck and cargo hatches. The vessel altered course as a matter of precaution and reduced speed in an attempt to minimise the rolling and pitching. When the hatch covers were removed at the discharge port it was found that some heavy lifting machinery on a flat rack trailer had shifted and damaged other containers and the cargo hold.

#### Causes:

The securing wires for the machinery were chaffing against the lashing points on the unit itself when the vessel was

rolling in the heavy weather. This may also be attributed to poor lashing arrangement. When the vessel was rolling 30° the wires parted and the machinery shifted.

### 5.3.4 New weight verification requirements for containers

The IMO (International Maritime Organization) will be adopting new requirements from 1 July 2016, requiring every packed export container to have a verified container weight as a condition for being loaded.

The IMO's Maritime Safety Committee (MSC), at its 93rd session (May 2014), approved changes to the Safety of Life at Sea (SOLAS) convention regarding a mandatory container weight verification requirement on shippers.

As stated, these requirements apply to shippers, but will also require all parties such as freight forwarders and shipowners to also prepare for these new requirements.

It is important to prepare for this as soon as possible and to update the ISM (International Safety Management) code where applicable.

This should improve safety for container vessels and reduce cargo claims.

The World Shipping Council has excellent information if you want to read more on this subject.

### 5.3.5 Design

The wide beam of many container vessels usually results in large metacentric heights (GM values). In some cases, where the vessel was partly laden, the GM values appear to have been excessive. This can become very problematic if the vessel is caught in heavy weather causing securing arrangements to break and containers to fall overboard. It is essential to monitor the weather during the entire voyage and if the vessel cannot avoid severe weather it is necessary to take action, such as reducing speed and/or altering course.

### 5.3.6 Prevention

It is obvious that small mistakes e.g. forgetting a gasket or not tightening the nuts correctly can cause costly cargo claims. It is important that tasks are completed by following checklists and procedures. It is generally a requirement for the Chief Officer to verify that jobs have been completed correctly. We have seen that this is often not the case, and the Chief Officer simply assumes that tasks have been correctly undertaken. This can mean the difference between an accident and no accident.

Misdeclaration of a container's contents is also very common and, of course, the containers misdeclared are often the ones most likely to cause a problem on board. Regrettably, there is much less that a Master can do in relation to containerised cargo compared to bulk or tank cargo.

It is often the case that a Master is provided with the Dangerous Goods Manifest only, and, indeed, it is unreasonable to expect him to review and verify the declared contents of every container on the vessel. In practice there is little more a Master can do other than to ensure that those dangerous goods he does know about are carried in accordance with the IMDG Code and that proper checks of the containers are carried out during the voyage.

#### 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, 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.
- Try to reduce the vessel's GM 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. 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.
- Crews need to investigate bilge alarms in the cargo holds as even a small amount of water can cause serious damage.
- Weather routing 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.
- It is not always easy to find the time to clean the bilges on a container vessel but it is something that has to be done or there is a high risk of pumps and valves becoming damaged. Many accidents are the result of bilge pumps and sensors becoming heavily corroded. The inspection of the bilges needs to be completed at least every month.
- Make sure the lashings are as per the cargo securing material if heavy weather cannot be avoided and it is essential that crews carry out extra rounds and check that any out of the ordinary cargo is properly secured.



## 5.4 Tankers

### 5.4.1 Statistics

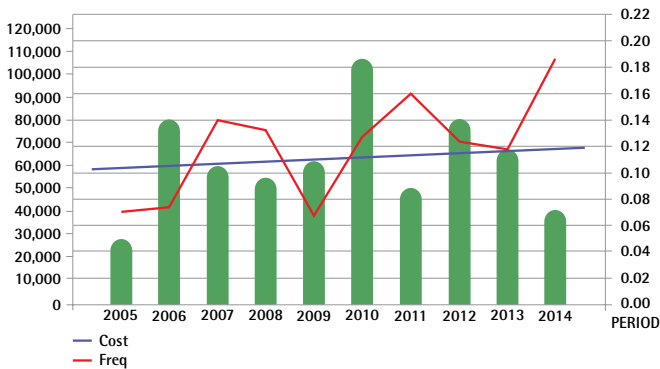
There has been a significant increase in the frequency of cargo claims since 2009, which needs to be monitored as a high frequency can negatively affect the overall claims cost.

The top 10 most expensive cargo claims over the past 10 years were in the following claim categories:

1. Leaking vents
2. Improper cargo handling, shore-side
3. Multiple reasons
4. Insufficient cleaning
5. Damage prior to loading
6. Improper cargo handling, shore-side
7. Improper cargo handling, shipside
8. Improper cargo handling, shipside
9. Leaking vents
10. Improper cargo handling, shipside

**Graph 5.16: Average claim cost and frequency Claims 5,000–3,000,000 (USD)**

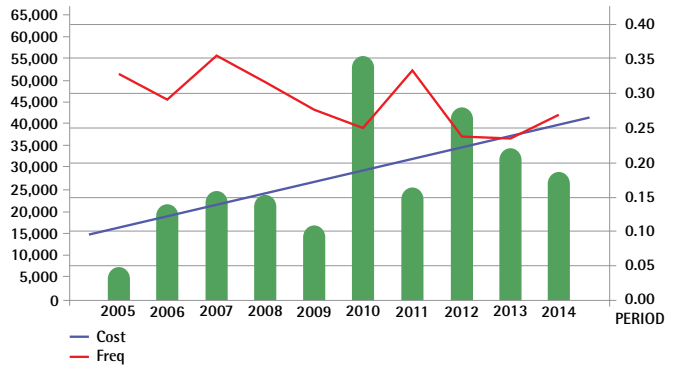
Period: 2005 - 2014  
 Type of vessel: Tanker  
 Type of claim: Cargo  
 As per 30/9/2015



The frequency for claims above USD 5,000 is increasing.

**Graph 5.17: Average claim cost and frequency Claims 1–3,000,000 (USD)**

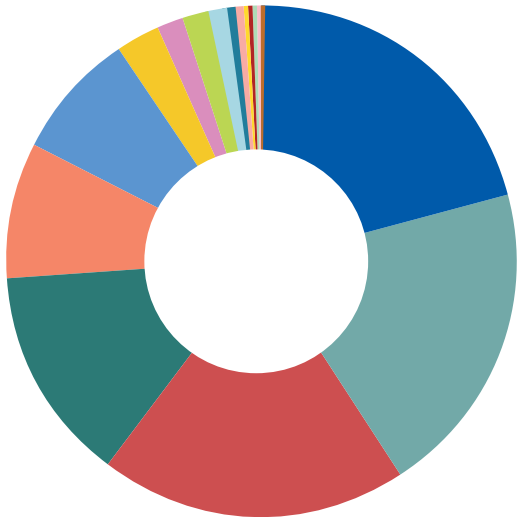
Period: 2005 - 2014  
 Type of vessel: Tanker  
 Type of claim: Cargo  
 As per 30/9/2015



The frequency for claims below USD 5,000 is decreasing.

**Graph 5.18: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005-2014  
 Type of vessel: Tanker  
 Type of claim: Cargo  
 As per 30/9/2015

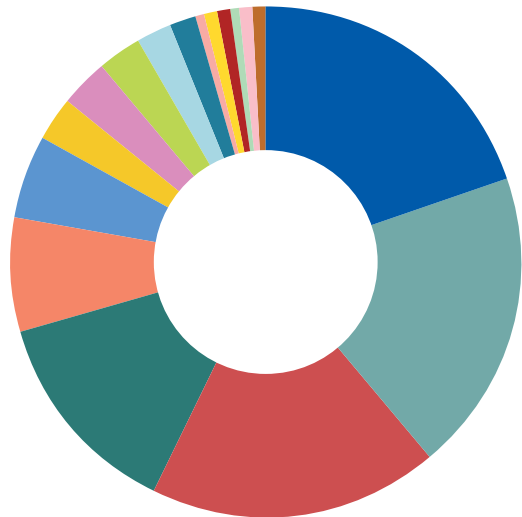


● Improper cargo handling, shore-side	21.15%
● Improper cargo handling, shipside	19.85%
● Insufficient cleaning	19.65%
● Leaking vents	13.65%
● Damage prior to loading	8.54%
● Multiple causes	8.15%
● Leaking cargo	2.91%
● Damage post discharge	1.64%
● Poor stowage	1.45%
● Poor tally	1.37%
● Inherent vice	1.12%
● Error in calculation	0.17%
● Fire	0.11%
● Flooding of hold	0.06%
● Grounding	0.06%
● Contact	0.06%
● Heavy weather	0.05%

The most costly immediate causes include improper cargo handling and insufficient cleaning, which are all caused by not following proper procedures and ensuring the cargo tanks are ready to receive cargo.

**Graph 5.19: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005-2014  
 Type of vessel: Tanker  
 Type of claim: Cargo  
 As per 30/9/2015



● Improper cargo handling, shipside	19.85%
● Insufficient cleaning	19.12%
● Improper cargo handling, shore-side	18.38%
● Damage prior to loading	13.24%
● Poor tally	7.35%
● Inherent vice	5.15%
● Leaking vents	2.94%
● Damage post discharge	2.94%
● Leaking cargo	2.94%
● Multiple causes	2.21%
● Error in calculation	1.47%
● Contact	0.74%
● Grounding	0.74%
● Fire	0.74%
● Heavy weather	0.74%
● Poor stowage	0.74%
● Flooding of hold	0.74%

The most common immediate causes include improper cargo handling, insufficient cleaning and damage prior to loading and can be prevented by following proper procedures.



### 5.4.2 Tanker cargo claims

Contamination is a major issue for chemical and product tankers as it is both the most frequent and the most costly type of claim. The most expensive tanker claims over the past 10 years were contamination claims.

**Shortage** – mainly caused by:

- Loaded or unloaded cargo not properly calculated
- Incorrect cargo handling shipside or shore-side

**Contamination** – mainly caused by:

- Insufficient tank cleaning
- Mixing of cargo
- Cargo contaminated prior to loading

**Concerns on chemical/product tankers**

- Gaskets on tank hatches in poor condition.
- Incorrect cargo cleaning.
- Failure to close valves after tank cleaning operations often causing contaminated cargo.
- No proper draining of old cargo.
- No proper loading plan addressing which valves and lines to be used.
- Poor sampling procedures.
- Not following charterer's instructions.
- Not maintaining required cargo temperature.
- Incorrect soundings.
- Contamination of palm, vegetable, and coconut oils which have little value once contaminated and lead to expensive claims.

### 5.4.3 Case Studies

#### Contamination

##### Contamination case study 1

The tanker had loaded gasoil in Nigeria from a mother ship for transport ashore, essentially as a lightering vessel at the port of Lagos. Upon testing of 'first foot' samples it was concluded that the flashpoint of the cargo indicated possible contamination with residues of previous cargo gasoline. It was found that about 600 tonnes of cargo were contaminated and the ship was rejected. It proved extremely difficult to dispose of the contaminated cargo in a part of the world largely unable to deal with the blending issues. Liability does appear to rest with the ship, because tank cleaning was not performed to the standards required by the charter.

##### Causes:

The problem was due to tank cleaning not being correctly carried out on the vessel.

##### Contamination case study 2

The tanker had loaded fatty acid methyl esters (FAME) and according to the plan all lines were completely segregated from the other piping system.

At the discharge port it was agreed that the FAME cargo could be discharged on the common line as the last cargo discharged on this line, in order to avoid shifting the connection of the discharge arm/hose from the common line.



Cargo tanks were blinded off from the cargo system (piping system) on the common line by valves and a spectacle flange. These changes were not updated in the discharge plan, which stated that the FAME should not be discharged through the common line.

After discharge the vessel drained the line's drain pump individually and pumped to a slop tank segregated from the cargo system and each cargo tank was super stripped, one by one.

In the next loading port the vessel loaded Jet-A1 cargo on the common line. After cargo tests had been completed it was found that the Jet-A1 had been contaminated by FAME.

### Causes:

The initial cargo plan was not followed. The vessel had an experienced crew on board that should have known that a limited amount of FAME would contaminate Jet-A1 fuel. If a cargo is loaded on a certain line to a specific tank, it should be clear to all staff involved. This factor should be considered during discharge, in order not to spread the specific cargo more than necessary in the line system, which may then require a more accurate cleaning method than draining. The procedures regarding proper cleaning procedures on board the vessel should be reviewed by the manager.

### Contamination case study 3

The tanker was loading Jet-A1. The previous cargo was unleaded gasoline. This cargo was loaded and discharged through a single arm connected to the manifold. After

discharge the cargo tanks were washed according to procedures. When tank cleaning was complete all tanks were vented and made inert.

Pre loading inspection was completed before loading commenced but because all tanks were made inert, this inspection simply involved checking that all tanks were dry.

A single loading arm was connected to the manifold and loading commenced. After the first foot had been loaded, samples were taken, and landed for analysis. The result of the samples failed due to low flash point and a second set of samples were taken. The sampling on both occasions was carried out using the vessel's closed sampling equipment. The second samples also failed the analysis.

### Causes:

A surveyor came on board to investigate and the vessel's cargo line system appeared to be in good order. There was no undrained residue of previous cargo left in the cargo lines. It was also confirmed that all other cargo lines were blown clear after tank cleaning was complete.

Samples taken from both the vessel's manifold and shore loading boom were at levels consistent with that recorded on the Certificates of Quality. The differing flash point of samples from shore-side and the pipes compared to the cargo tanks showed that the contamination happened in the vessel's cargo tanks. The cause is believed to be because of insufficient tank cleaning.

### Contamination case study 4

The tanker loaded two different cargoes in the loading port. The first cargo was gasoil and the other was motor gasoline (mogas). The tanker then sailed for the discharge port where it berthed at the terminal and commenced discharging the gasoil the following day.

Discharge was then stopped because the shore manifold samples were off-spec. Samples were also taken from a tank with mogas and another tank with gasoil, which showed the former to be off-spec for final boiling point and residue, and the latter off-spec for flash-point.

After the situation was discovered the vessel was sent to an anchorage. Three days later the vessel was requested to reload the gasoil it had discharged. There were some issues, causing the vessel to be delayed, and it took a couple of weeks until the vessel had reloaded the cargo and arrived at the discharge port for the mogas. There was a short delay as a pump in one of the tanks broke down. Some of the gasoil was also discharged.

The vessel then sailed for the last discharge port where it discharged the last of the gasoil and the reloaded gasoil, which was in the slop tanks.

### Causes:

It seems that contamination occurred because of leaking valves, as it was found that several valves did not work properly and rags and ropes were found between valves. Alternatively a valve was open by mistake and caused the contamination.

All valves were overhauled and repaired as needed. The cargo lines were then pressure tested with successful results.

In a recent study, Dr Wesley Tucker highlights some of the problems on board oil tankers and why contamination happens.

For an in depth analysis of the issue see [Appendix \(ii\) Bulk liquid chemicals and fuels: Insight into specifications and Contaminations](#)

## 5.4.4 Prevention

### Cleaning

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

### Segregation

- Plan and document the lining-up of valves, blinds, etc.
- Inert lines and vapour return lines also to be segregated, 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

- 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. All procedures must be properly documented.



## Specific prevention for chemical/ product tankers

### Contamination

Even if cleaning has been completed and a certificate of cleanliness issued, cargo can still be contaminated. This is often because water is left in the lines and they have not been blown and cleaned properly.

Other common reasons are ingress of seawater, cracks between cargo tanks, insufficient cleaning of tanks and lines, incorrect valve operation and failure of mechanical devices such as pumps and pipes and also vapour and migration of cargo. The cost of a claim differs vastly depending on whether the off-spec or contaminated cargo is discovered at full tank or during the initial cargo sample. It is not only the cost for spoiled or even worthless cargo that affects the total cost of the claim. Delay and demurrage costs will also contribute significantly to the overall cost.

### Sampling of cargo

It is imperative to always take comprehensive cargo samples. Analysis of cargo samples is vital in any investigation into the cause of contamination. The common practice by some terminals to provide only cargo samples from shore tanks and samples from the vessel's tanks after loading is not sufficient. It does not provide the essential information about the condition

the cargo arrives in at the vessel's manifold. It is not unusual that the cause of the contamination is because of contaminated shore lines.

It is assumed that all chemical/product tankers are fitted with sampling cocks at the cargo manifold. If these are not fitted, it is a simple modification.

Before sampling, the sampling cock must be properly flushed in order to obtain a representative sample. The sampling cocks must be completely clean.

For sampling the cargo when it arrives at the ship's manifolds, there are three crucial stages.

The first stage is the condition of the cargo when loading commences. Any remnants of previous cargoes and/or any other contaminants (water) in the shore line, liable to affect the cargo adversely, will appear in a manifold sample drawn immediately upon starting loading.

The second stage is to ascertain whether contaminants may have found their way into the cargo in the shore line in the course of loading. This can be done by drawing samples from the manifold at regular intervals.

The third stage is when the terminal is reporting that they are shifting from one shore tank to another.

Finally, cargo samples from each cargo tank have to be taken after the loading is completed.



## 6 Injury

### 6.1 Introduction

Graph 6.1 shows that the frequency for injuries has increased substantially since 2012. The average cost, in common with some of the other claims categories accounted for above, has been relatively stable.

Again, it is the frequency that is a warning sign. The increased frequency may 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 the individual on board the vessel, an increase in stress-related conditions and the erosion of social interaction in the lifestyle at sea. Seafarers are under pressure to deliver high performance for sustained periods and they have fewer outlets for the vital social and leisure activities enjoyed by their counterparts ashore.

The top 10 individual most expensive injury claims over the past 10 years were in the following claim categories:

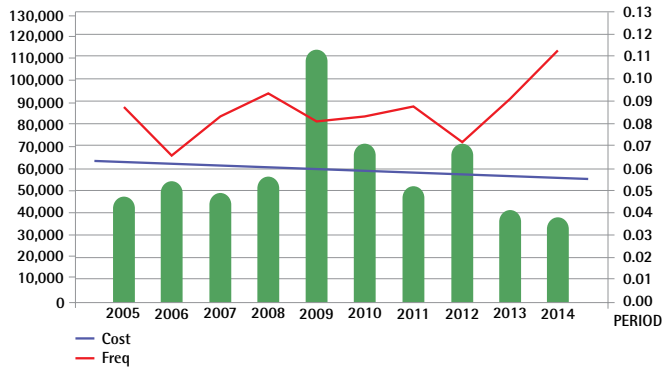
1. Burns and explosions	Container
2. Slips and falls	Container
3. Slips and falls	Container
4. Struck by falling object	Bulker
5. Struck by falling object	Container
6. Caught in machinery or equipment	Bulker
7. Slips and falls	Container
8. Struck by falling object	Container
9. Slips and falls	Container
10. Slips and falls	Container

## 6.2 Statistics

### Bulk carriers, container vessels and tankers

**Graph 6.1: Average claim cost and frequency Claims 5,000–3,000,000 (USD)**

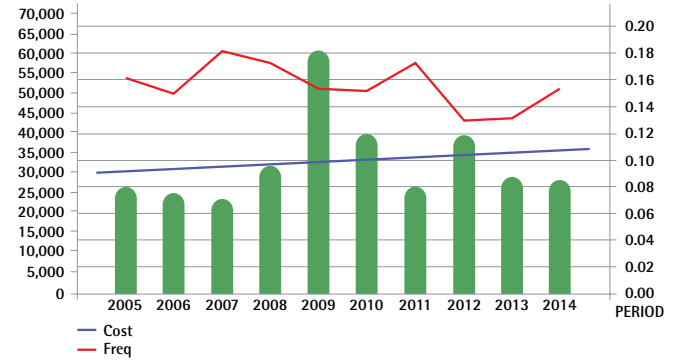
Period: 2005–2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Injury  
 As per 5/10/2015



The frequency for claims above USD 5,000 is increasing.

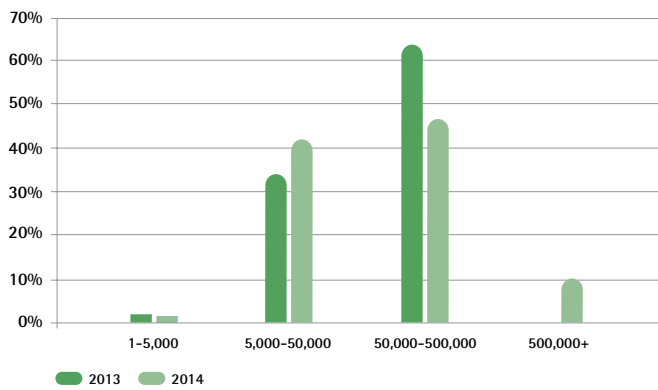
**Graph 6.2: Average claim cost and frequency Claims 1–3,000,000 (USD)**

Period: 2005–2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Injury  
 As per 5/10/2015

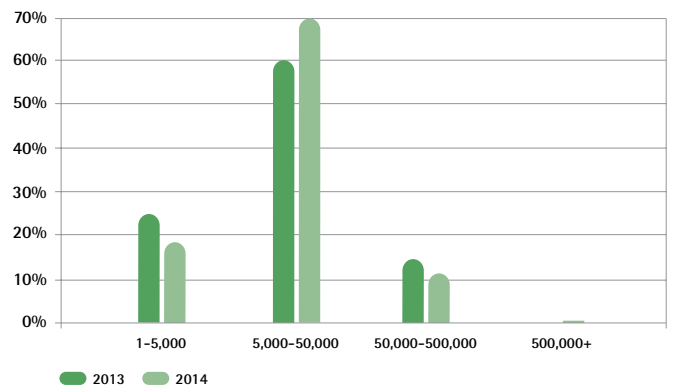


The frequency for claims below USD 5,000 is decreasing.

**Graph 6.3: Injury – distribution of cost (USD) 2013–2014**



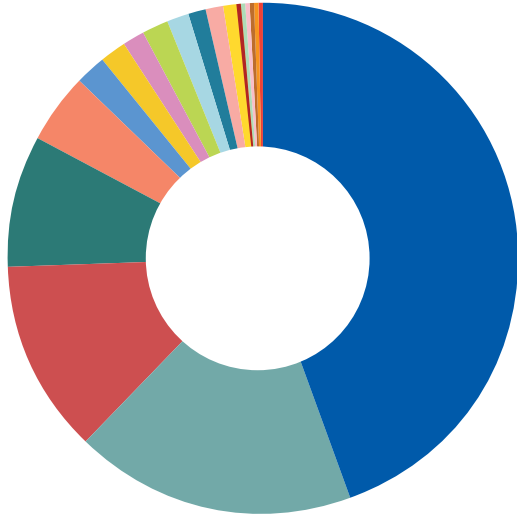
**Graph 6.4: Injury – number of claims (USD) 2013–2014**



The trends here are similar to illness where we can see that most claims are in the interval USD 5,000 – USD 50,000.

**Graph 6.5: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

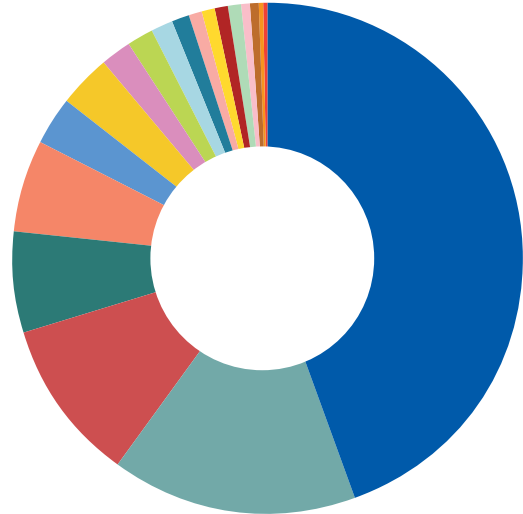
Period: 2005-2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Injury  
 As per 7/10/2015



● Slips and falls	44.60%
● Struck by falling object	17.79%
● Burns and explosions	12.12%
● Caught in machinery or equipment	8.50%
● Struck/caught by object(s)	4.33%
● Strain by lifting	1.89%
● Suffocation/asphyxiation	1.70%
● Strain by pulling or pushing	1.58%
● Suicide attempt	1.46%
● Strain by carrying	1.40%
● Drowning	1.22%
● Tool injury (non-powered)	1.04%
● Struck by vehicle	1.03%
● Chemical exposure	0.39%
● Electric shock	0.37%
● Man overboard	0.19%
● Power tool injury	0.17%
● Fight	0.13%
● Cut by object	0.11%

**Graph 6.6: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005-2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Injury  
 As per 7/10/2015



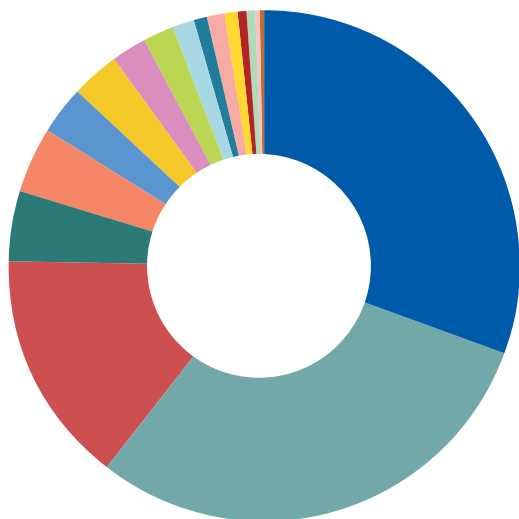
● Slips and falls	44.55%
● Struck by falling object	15.45%
● Caught in machinery or equipment	10.30%
● Burns and explosions	6.53%
● Struck/caught by object(s)	5.74%
● Strain by pulling or pushing	3.17%
● Strain by lifting	3.17%
● Tool injury (non-powered)	1.98%
● Strain by carrying	1.78%
● Chemical exposure	1.39%
● Power tool injury	1.19%
● Suffocation/asphyxiation	0.79%
● Drowning	0.79%
● Struck by vehicle	0.79%
● Fight	0.79%
● Suicide attempt	0.59%
● Cut by object	0.59%
● Man overboard	0.20%
● Electric shock	0.20%



## Bulk carriers

**Graph 6.7: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

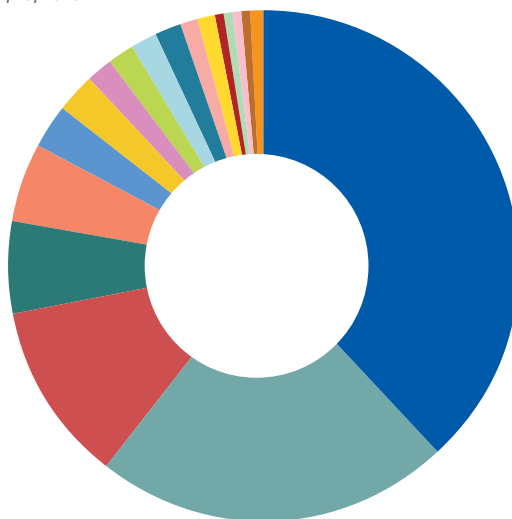
Period: 2005-2014  
 Type of vessel: Bulker  
 Type of claim: Injury  
 As per 7/10/2015



● Slips and falls	30.78%
● Struck by falling object	29.81%
● Caught in machinery or equipment	14.82%
● Suicide attempt	4.42%
● Struck/caught by object(s)	4.09%
● Burns and explosions	3.26%
● Suffocation/asphyxiation	2.86%
● Tool injury (non-powered)	2.30%
● Struck by vehicle	2.00%
● Electric shock	1.23%
● Strain by pulling or pushing	1.04%
● Strain by lifting	0.96%
● Chemical exposure	0.88%
● Man overboard	0.62%
● Drowning	0.43%
● Strain by carrying	0.42%
● Power tool injury	0.07%

**Graph 6.8: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005-2014  
 Type of vessel: Bulker  
 Type of claim: Injury  
 As per 7/10/2015

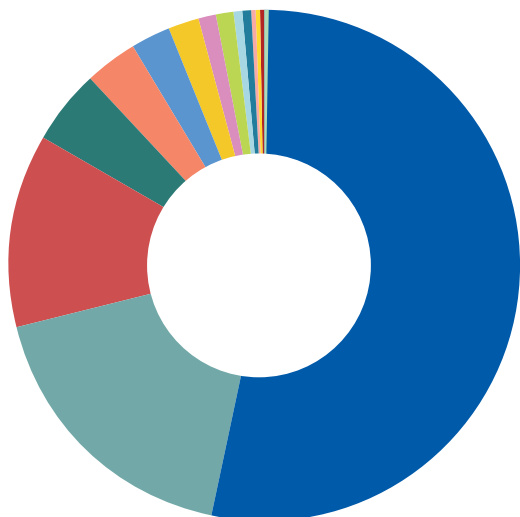


● Slips and falls	38.07%
● Struck by falling object	22.73%
● Caught in machinery or equipment	11.36%
● Struck/caught by object(s)	5.68%
● Burns and explosions	5.11%
● Tool injury (non-powered)	2.84%
● Strain by lifting	2.27%
● Strain by carrying	1.70%
● Chemical exposure	1.70%
● Strain by pulling or pushing	1.70%
● Suffocation/asphyxiation	1.70%
● Suicide attempt	1.14%
● Struck by vehicle	1.14%
● Drowning	0.57%
● Man overboard	0.57%
● Cut by object	0.57%
● Electric shock	0.57%
● Power tool injury	0.57%

## Container vessels

**Graph 6.9: Cost per loss code –claim categories**  
**Claims 5,000–3,000,000 (USD)**

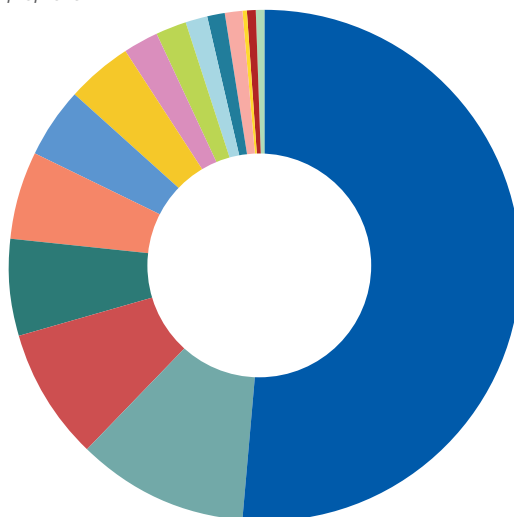
Period: 2005-2014  
 Type of vessel: Container  
 Type of claim: Injury  
 As per 7/10/2015



● Slips and falls	53.48%
● Burns and explosions	17.81%
● Struck by falling object	12.25%
● Struck/caught by object(s)	4.83%
● Caught in machinery or equipment	3.24%
● Strain by lifting	2.54%
● Strain by pulling or pushing	1.78%
● Drowning	1.20%
● Strain by carrying	1.09%
● Struck by vehicle	0.65%
● Tool injury (non-powered)	0.52%
● Power tool injury	0.26%
● Fight	0.23%
● Cut by object	0.11%
● Chemical exposure	0.04%

**Graph 6.10: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005-2014  
 Type of vessel: Container  
 Type of claim: Injury  
 As per 7/10/2015

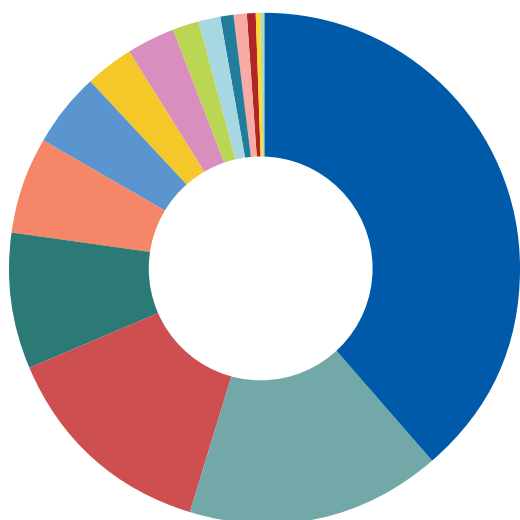


● Slips and falls	51.58%
● Struck by falling object	10.86%
● Caught in machinery or equipment	8.14%
● Burns and explosions	6.33%
● Struck/caught by object(s)	5.43%
● Strain by lifting	4.45%
● Strain by pulling or pushing	4.07%
● Power tool injury	2.26%
● Fight	1.81%
● Strain by carrying	1.36%
● Tool injury (non-powered)	1.36%
● Drowning	0.90%
● Struck by vehicle	0.45%
● Cut by object	0.45%
● Chemical exposure	0.45%

## Tankers

**Graph 6.11: Cost per loss code – claim categories**  
Claims 5,000–3,000,000 (USD)

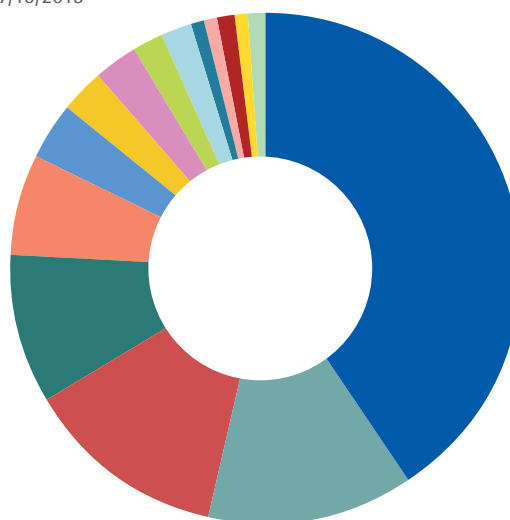
Period: 2005-2014  
Type of vessel: Tanker  
Type of claim: Injury  
As per 7/10/2015



● Slips and falls	38.82%
● Caught in machinery or equipment	16.14%
● Struck by falling object	13.91%
● Burns and explosions	8.41%
● Suffocation/asphyxiation	6.15%
● Strain by carrying	4.83%
● Drowning	3.05%
● Struck/caught by object(s)	2.85%
● Strain by pulling or pushing	1.92%
● Strain by lifting	1.30%
● Suicide attempt	0.86%
● Chemical exposure	0.76%
● Struck by vehicle	0.45%
● Tool injury (non-powered)	0.36%
● Cut by object	0.23%

**Graph 6.12: Frequency per loss code – claim categories**  
Claims 5,000–3,000,000 (USD)

Period: 2005-2014  
Type of vessel: Tanker  
Type of claim: Injury  
As per 7/10/2015



● Slips and falls	40.74%
● Struck by falling object	12.96%
● Caught in machinery or equipment	12.96%
● Burns and explosions	9.26%
● Struck/caught by object(s)	6.48%
● Strain by pulling or pushing	3.70%
● Strain by carrying	2.78%
● Chemical exposure	2.78%
● Tool injury (non-powered)	1.85%
● Strain by lifting	1.85%
● Struck by vehicle	0.93%
● Cut by object	0.93%
● Drowning	0.93%
● Suffocation/asphyxiation	0.93%
● Suicide attempt	0.93%

## 6.3 Injury claims

Statistics show that slips and falls are the biggest concern on all three types of vessel studied. The locations on board where most injuries occur are the cargo deck area, machinery room and open deck areas. Most injuries happen during routine maintenance, which normally requires a work permit and risk assessment. There should be procedures in the SMS which address these tasks. The concern is that these procedures have been ignored.

The three most common claim types are slips and falls, being struck by a falling object and being caught in machinery. This is similar across all three types of vessel. One concern is that almost 60% of all slips and falls occur on container vessels. The reason for this might be that there are a lot of stevedores involved in loading a container vessel and a great deal of equipment lying on deck when containers are being secured.

Slips and falls – mainly caused by:

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

Being struck by a falling object – mainly caused by:

- Equipment not secured for sea

Being caught in machinery – mainly caused by:

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

### Injury claims case study 1

The vessel was in port and the Master planned to carry out a rescue boat drill because no drill had been completed since the vessel was delivered about a month earlier. The weather was favourable and the harbour authority had given the vessel clearance to launch and manoeuvre the rescue boat in the harbour. The personnel assigned to the rescue boat in an emergency were the Chief Officer, Bosun, Oiler, and the Third Engineer.

The Chief Officer was in charge of organising the drill. He had joined the vessel in the shipyard about two months before delivery. During that time he had watched the shipyard complete a rescue boat drill but had not been involved himself.

Before the drill commenced the Chief Officer had a short briefing with all available crew and the Master.

After the briefing, the crew assigned to the rescue boat embarked. The Master informed the rescue boat crew that the safety pin should be removed before the rescue boat was waterborne. He did not state at what precise height the pin should be removed but assumed the crew would remove it just before the boat was waterborne.

The Chief Officer pulled the slewing wire until the boat was positioned so it could be lowered. He then pulled the lowering wire until the boat was three metres above the surface, where he removed the safety pin. At the same time the slewing wire, which was hanging free, somehow got caught in the release lever for the hook and caused the boat to drop into the water. The boat was quickly retrieved and the injured crew received medical attention.

### Causes:

The manager had received no specific instructions in using the training manual, SMS, PMS or any other manual on how the rescue boat should be launched. In SOLAS chapter III regulation 35.3 there is a requirement for detailed instructions in the training manual on how the rescue boat should be launched. In the Chief Officer's statement he stated that this was the first time he was involved in a rescue boat drill even though he had been a Chief Officer for more than a year and been at sea since 2002. It is important to be aware that there is a SOLAS chapter III reg 3.3.6 requirement that the rescue boat should be launched every month or a minimum of every three months.

### Injury claims case study 2

It was morning and the Bosun and three other AB's had planned to remove some rust and paint from one of the cargo holds. The Bosun started to scrape the parts he could reach from the tank top and when this was done a ladder was rigged to reach areas higher up.

The Bosun and the AB's were working at different areas in the cargo hold. The Bosun climbed up the ladder he had rigged. Suddenly a thud was heard and the AB's saw the Bosun lying on the tank-top on his back, the Bosun's chair and safety harness was lying by his legs.

One of the AB's raised the alarm and 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 bay. He was bleeding from his head, ears and nose and had fractured





his legs and right wrist. He was conscious and in great pain. The vessel made contact with Maritime Rescue Coordination Centre and a helicopter was dispatched to the vessel. At this time the vessel was about 200 miles from land and it took the helicopter about 4 hours to arrive.

#### Causes:

The hook on the Bosun's chair had broken and the Bosun fell. The safety harness had not been secured correctly.

### Injury claims case study 3

The vessel was alongside waiting to prepare for dry-docking. The vessel carried cranes with grabs that weighed 10 tonnes and were more than 4m high which were used during cargo operations. During the daily safety meeting the superintendent informed personnel that four grabs were to be taken ashore. The Chief Officer had carried out a risk assessment of the operation and was monitoring the operation from the vessel. The plan was to land the grabs in the open position onto a trailer on the quay.

An AB was operating the crane for lifting the grabs. Two cadets, the Third Officer, two ABs and the vessel's Superintendent were on the quay. The Chief Officer had instructed the two cadets to help only if specifically needed. The ABs were instructed to remove the wires when the grab was safely secured on the trailer.

The AB operating the crane landed the grabs on the trailer in the open position with the bucket in a forward and aft direction. As soon as the grab was landed on the trailer one

of the cadets climbed onto the grab to release the wires. The Superintendent shouted to the cadet to get down at once. It could be seen that when the grab was on the trailer it was approximately 10 metres high, which was above the height restriction at the shipyard and on the roads, and so it was necessary to change the plan.

The decision was made to lay the bucket in the closed position with one side resting on the trailer bed.

The bucket was closed and the grab was lifted and swung to reposition the bucket in an athwart ship direction. When the grab was landed it was secured by thick wooden planks below the bucket sides. Once the grab was stable the cadet once again climbed up on the grab to release the two hoisting wires from the crane. At this time the Superintendent was focusing on another task and the other ABs and cadet were working with tensioning wires on the trailer and so did not that the cadet had once again climbed up.

The cadet removed the wires from the grab. He had secured his safety harness to the grab but then released the safety harness when he was climbing down, relying on the fact that he had secured a rope to the top of the grab to assist him while climbing down. The grab appeared to be stable but in fact was top heavy with a centre of gravity about one third the way down from the top of the grab, as it was in the closed position. While the cadet was climbing down from the grab it suddenly moved and fell into the water with the cadet. The Third Officer threw a lifebuoy to the cadet in the water. He was taken to the hospital where he was diagnosed with serious injuries and internal bleeding.

### Causes:

The cadet had been told not to climb onto the trailer but had apparently not understood the risks involved. It is essential to ensure that only crew members are involved in difficult and dangerous jobs and that all on board are made thoroughly aware of the risks.

### Injury claims case study 4

It was morning, the weather was good with a northerly force 3-4 wind and the vessel was proceeding at 14 knots. The Chief Engineer, First Engineer and Third Engineer were scheduled to carry out routine maintenance on one of the ballast pumps. They dismantled the pump and removed the shaft and impeller, while the nuts on the pump case had also been removed. This had been prepared in advance. The shaft had been secured in a threaded hole with a chain to an eyebolt. The engineers used a five-ton SWL chain block, which was secured in a monorail, and the shaft was raised so the engineers could work on it more easily. The shaft was to be moved so another chain block could be attached. While waiting for the chain block the engineers began to inspect the shaft and rotated it a couple of times. Suddenly the shaft dropped from the eyebolt and the Third Engineer's hand was severed. The First Engineer was also seriously injured and his hand was crushed.

The vessel diverted to the nearest harbour. Medical assistance was established with an MRCC and a helicopter was dispatched, which arrived three hours later. At the time of the accident the injured crewmembers were wearing safety shoes, gloves, boiler suits and helmets, but this obviously did not protect them in the circumstances they encountered. It could not be completely established why the eyebolt was unscrewed. The lifting appliances were certified and approved for the lifted weight and they were not damaged.

### Causes:

The engineers stated that they had secured the bolt tightly. The immediate cause of the accident according to the company's own report suggests that the bolt unscrewed because it was not tightened correctly, the engineers were in a hurry and more than one person was rotating the shaft.

Because of the accident's severity, the injured crewmembers could not continue working at sea.

### Injury claims case study 5

The container vessel was berthed port side with cargo operation commencing shortly after arrival. The weather was good - clear with no discernable wind. During cargo operation the Chief Officer was in charge and the Second

and Third Officers were working six on - six off watches, with one AB assisting in the cargo operation and another AB with ISPS (International Ship and Port Facility Security) duty on the gangway. The loading plan was presented to the Chief Officer by the terminal supervisor and two gantry cranes were planned to assist in the cargo operation. The Chief Officer presented the lashing plan to the terminal supervisor.

When a container was lifted from the quay the stevedores working at the front and rear of the container fitted the twist lock to the container's corners. When this was done the gantry crane lifted the container to its allocated position. At the required location the crane operator adjusted the alignment before setting down the container onto the container below. The twist locks automatically locked to the container below when it was put in position. At this time there were two stevedores attaching lashings to containers and they were standing underneath the containers as they were being loaded.

The Second and Third Officers were carrying out the handover of the cargo watch when they heard a scream. The officers saw a stevedore lying on one of the hatch covers. They quickly gave him first aid and raised the alarm. The Second Officer went to the vessel's hospital for the stretcher and the Master informed the terminal about the accident. About ten minutes later the terminal's own emergency response team arrived and gave the stevedore first aid while waiting for an ambulance. The ambulance shortly arrived and the stevedore was taken to hospital. It took about 50 minutes from the time of the accident until the stevedore was in the ambulance.

The stevedore was conscious and had a gash on his head. Close to him was a twist lock and his safety helmet which was not broken, but was scratched. The gantry crane still had the container attached and the Second Officer saw that one of the twist locks was missing. The twist lock had dropped from a height of about eight metres.

### Causes:

The twist locks had not been secured correctly by the stevedores and the stevedore was standing underneath the container, which is very unsafe.

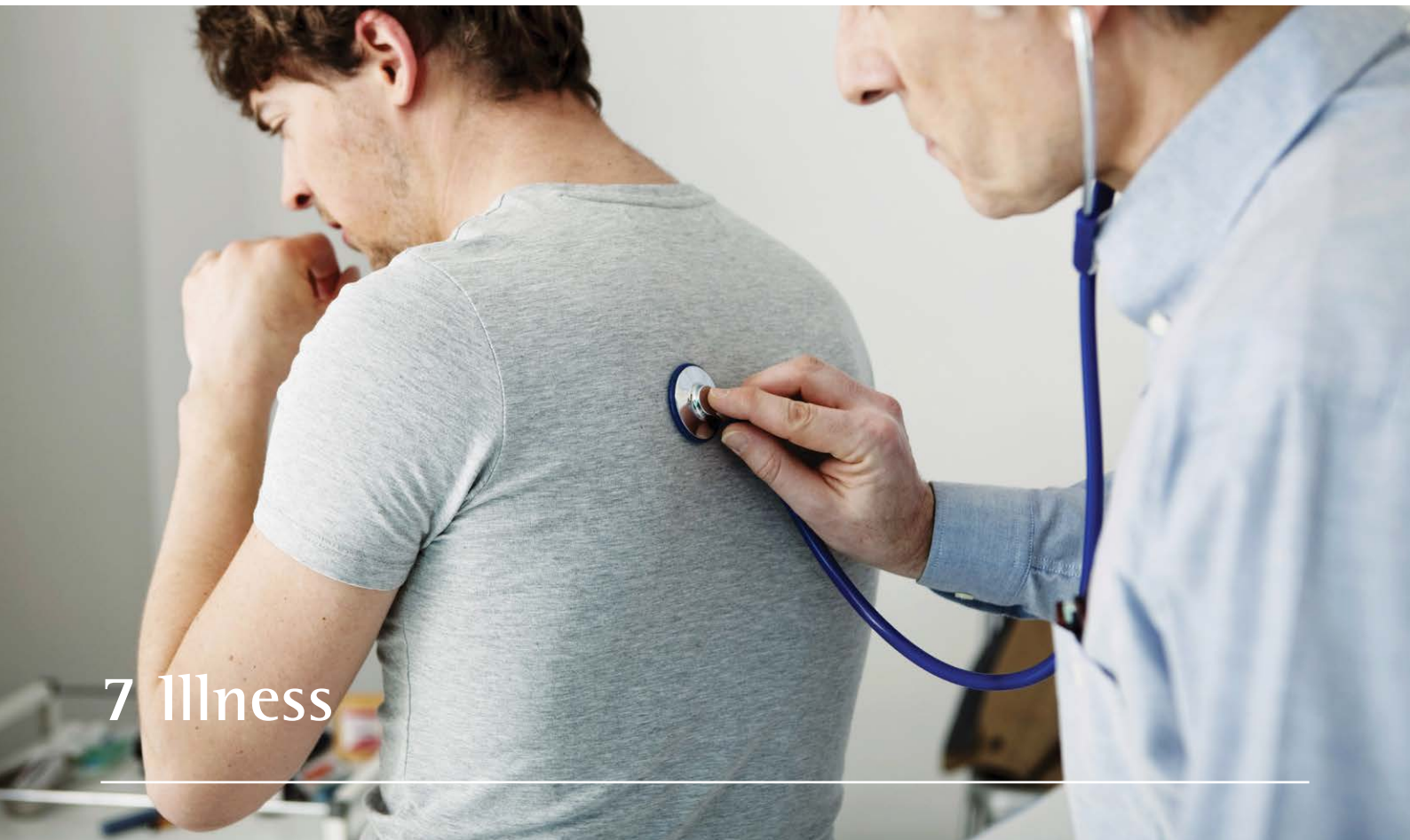
### Injuries to stevedores in the USA

Over the years there have been a number of expensive cases involving stevedores. [Appendix \(iii\) Specific issues in the USA](#) from Keith Letourneau explains why this is, and what issues a shipowner should consider.

## 6.4 Prevention

Many accidents can be prevented if vessels keep good housekeeping and ensure that maintenance is carried out as required. The following procedures will assist the officers in identifying hazardous areas before the accident happens. These suggestions should be implemented into the managers ISM (International Safety Management) Code.

- Follow a checklist, which identifies potentially hazardous conditions, including a simple vessel diagram showing the main deck, cargo holds and other areas where the 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 and rusty conditions of deck.
- 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 (Planned Maintenance System).
- The Master should ensure that critical equipment such as cranes are regularly inspected and working properly.



## 7.1 Introduction

The frequency of illness was somewhat stable between 2009 and 2014. However we have seen a steady rise in the average cost of illness over the past ten years and are now seeing a sharp increase in frequency. This high frequency is a warning sign and this category must be closely monitored going forward.

The ever-increasing problem for the industry in finding experienced, properly trained seafarers, is another reason for keeping a close watch on this issue, as this seems to be a problem that is here to stay.

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

To help prevent these problems the owner can promote a healthier diet, ensure there are exercise facilities on board, discourage smoking and drinking; support crew members who wish to change their lifestyle, and offer a PEME (Pre-Employment Medical Examination) to their crew members before being employed.

The top 10 individual most expensive illness claims over the past 10 years were in the following claims categories:

### Conditions of:

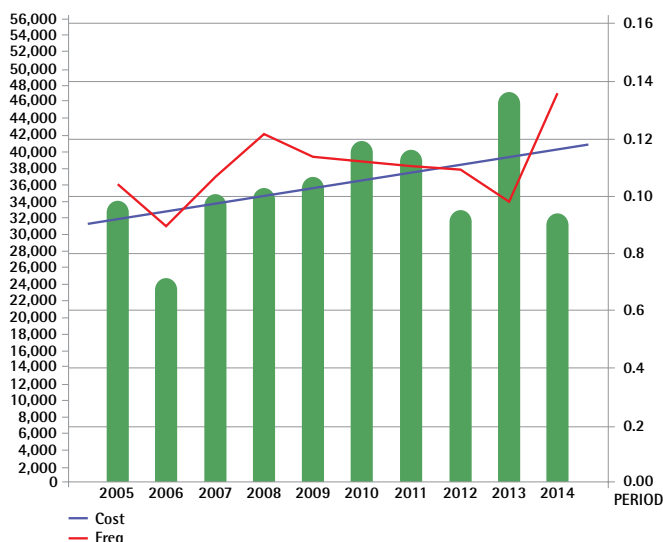
- |                          |           |
|--------------------------|-----------|
| 1. Nervous system        | Tanker    |
| 2. Digestive system      | Container |
| 3. Cardiovascular system | Container |
| 4. Cardiovascular system | Container |
| 5. Cardiovascular system | Bulker    |
| 6. Cardiovascular system | Container |
| 7. Cardiovascular system | Bulker    |
| 8. Genito-urinary system | Container |
| 9. Cardiovascular system | Tanker    |
| 10. Nervous system       | Bulker    |

## 7.2 Statistics

### Bulk carriers, container vessels and tankers

**Graph 7.1: Average claim cost and frequency  
Claims 5,000–3,000,000 (USD)**

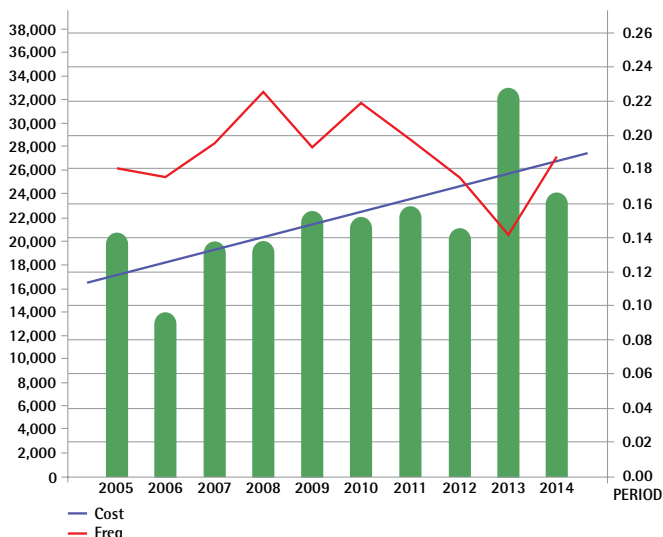
Period: 2005–2014  
Types of vessel: Bulk carriers, containers and tankers  
Type of claim: Illness  
As per 5/10/2015



The above statistics show that over the last ten years the frequency and cost for claims more than USD 5,000 is increasing.

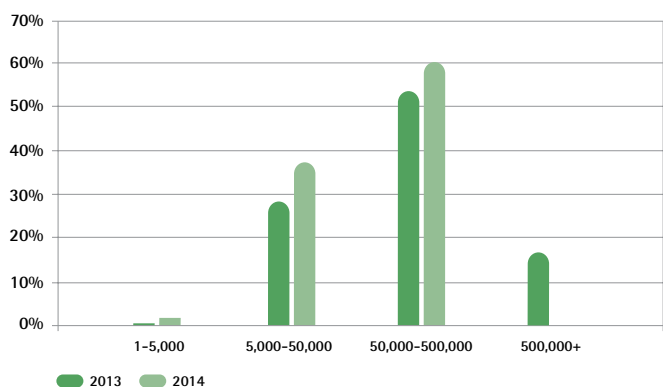
**Graph 7.2: Average claim cost and frequency  
Claims 1–3,000,000 (USD)**

Period: 2005–2014  
Types of vessel: Bulk carriers, containers and tankers  
Type of claim: Illness  
As per 5/10/2015

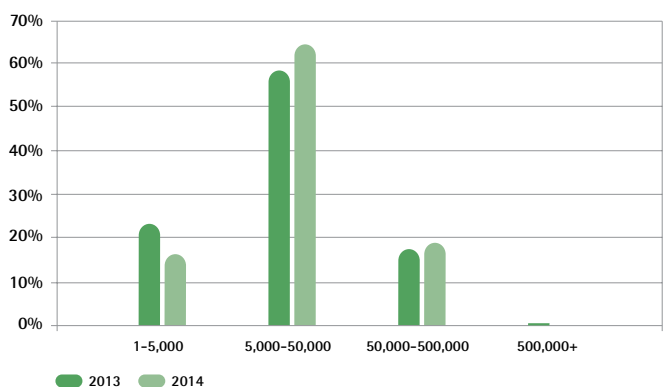


The frequency for claims below USD 5,000 is fluctuating and was actually falling until 2013, but then started to increase. Costs have been constantly increasing over the past ten years.

**Graph 7.3: Illness – distribution of cost (USD)  
2013–2014**



**Graph 7.4: Illness – number of claims (USD)  
2013–2014**

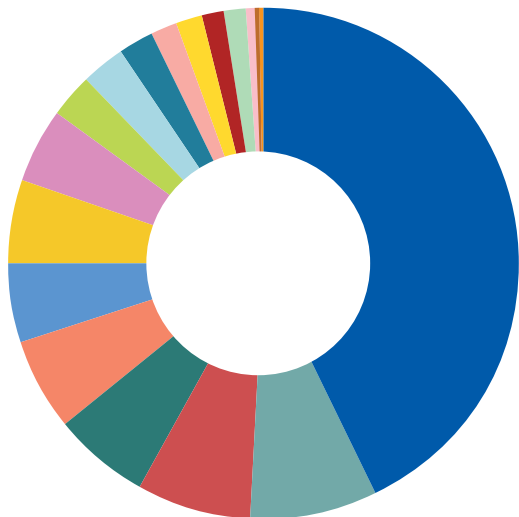


It is interesting to note that claims in the 1–5,000 interval have fallen, but those in the 5,000–50,000 interval have risen. Costs have risen in every category. The reason for this might be because of increased medical cost and older crew, which need more medical assistance.



**Graph 7.5: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

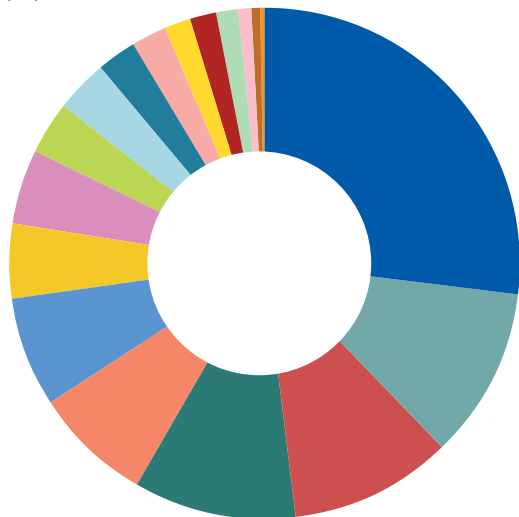
Period: 2005–2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Illness  
 As per 5/10/2015



● Conditions of the cardiovascular system	42.89%
● Conditions of the digestive system	8.06%
● Conditions of the nervous system	7.38%
● Infectious and parasitic diseases	5.89%
● Conditions of the musculoskeletal system	5.83%
● Conditions of the genito-urinary system	5.22%
● Conditions of the respiratory system	5.06%
● Appendicitis	4.73%
● Mental disorders	2.84%
● Multiple causes	2.74%
● Endocrine, nutritional, metabolic and immunity	2.44%
● Diseases of the blood and blood-forming organs	1.68%
● Neoplasms	1.45%
● Eyes	1.45%
● Conditions of the skin	1.44%
● Ears	0.72%
● Oral health	0.13%
● Hernia	0.05%

**Graph 7.6: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Types of vessel: Bulk carriers, containers and tankers  
 Type of claim: Illness  
 As per 5/10/2015



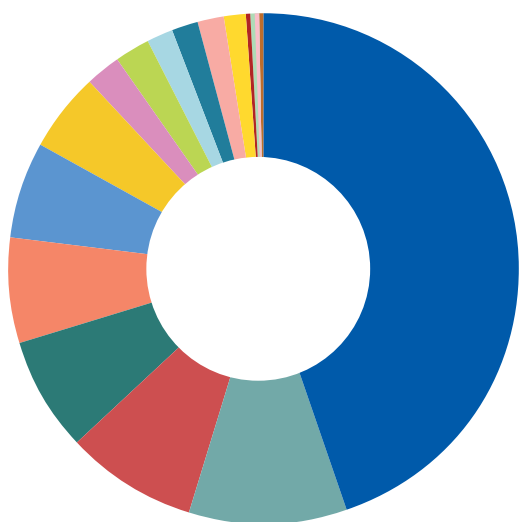
● Conditions of the cardiovascular system	27.05%
● Conditions of the musculoskeletal system	10.82%
● Conditions of the genito-urinary system	10.38%
● Conditions of the digestive system	10.09%
● Appendicitis	7.60%
● Infectious and parasitic diseases	7.02%
● Mental disorders	4.82%
● Conditions of the respiratory system	4.68%
● Conditions of the nervous system	3.36%
● Conditions of the skin	3.22%
● Endocrine, nutritional, metabolic and immunity	2.36%
● Diseases of the blood and blood-forming organs	2.05%
● Multiple causes	1.75%
● Neoplasms	1.61%
● Eyes	1.32%
● Ears	0.88%
● Oral health	0.58%
● Hernia	0.15%

Cardiovascular illness is considerably more costly than any other category for all types of vessel and also reports the highest frequency.

## Bulk carriers

**Graph 7.7: Cost per loss code – claim categories**  
Claims 5,000–3,000,000 (USD)

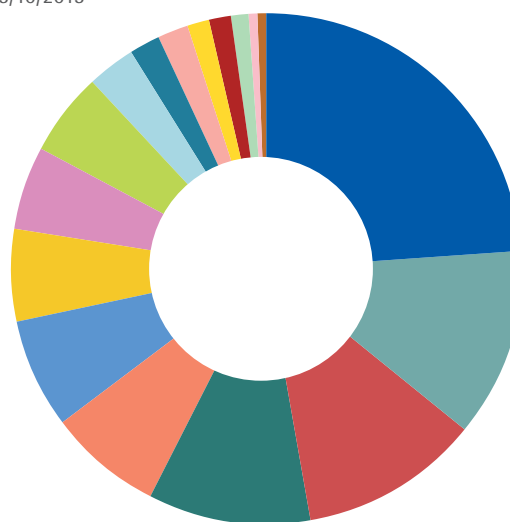
Period: 2005-2014  
Type of vessel: Bulker  
Type of claim: Illness  
As per 5/10/2015



● Conditions of the cardiovascular system	44.80%
● Conditions of the nervous system	10.17%
● Conditions of the digestive system	8.14%
● Conditions of the respiratory system	7.44%
● Appendicitis	6.64%
● Infectious and parasitic diseases	6.03%
● Conditions of the genito-urinary system	4.86%
● Conditions of the musculoskeletal system	2.35%
● Mental disorders	2.26%
● Eyes	1.71%
● Endocrine, nutritional, metabolic and immunity	1.71%
● Neoplasms	1.64%
● Multiple causes	1.27%
● Conditions of the skin	0.42%
● Diseases of the blood and blood-forming organs	0.33%
● Ears	0.15%
● Oral health	0.08%

**Graph 7.8: Frequency per loss code – claim categories**  
Claims 5,000–3,000,000 (USD)

Period: 2005-2014  
Type of vessel: Bulker  
Type of claim: Illness  
As per 5/10/2015



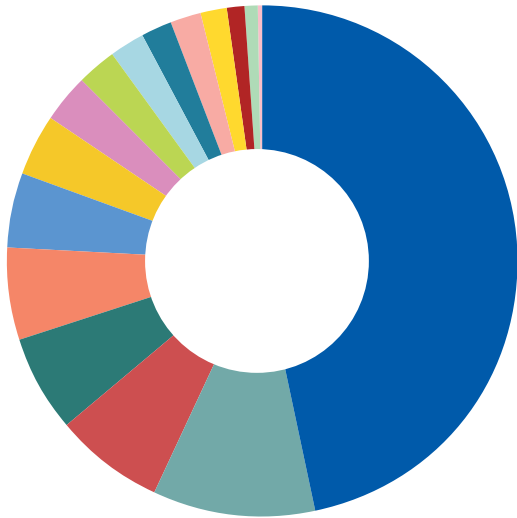
● Conditions of the cardiovascular system	23.90%
● Appendicitis	12.20%
● Conditions of the digestive system	11.22%
● Conditions of the genito-urinary system	10.24%
● Conditions of the musculoskeletal system	7.32%
● Infectious and parasitic diseases	6.83%
● Conditions of the nervous system	5.85%
● Mental disorders	5.37%
● Conditions of the respiratory system	5.37%
● Endocrine, nutritional, metabolic and immunity	2.93%
● Neoplasms	1.95%
● Eyes	1.95%
● Multiple causes	1.46%
● Conditions of the skin	1.46%
● Diseases of the blood and blood-forming organs	0.98%
● Ears	0.49%
● Oral health	0.49%

Cardiovascular conditions are the most expensive category of claim and are also the most common.

## Container vessels

**Graph 7.9: Cost per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

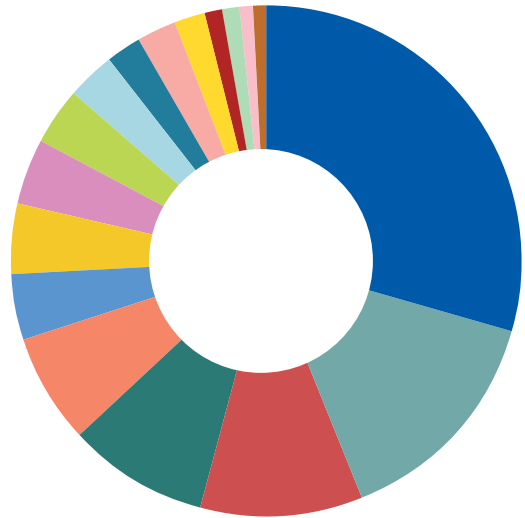
Period: 2005–2014  
 Type of vessel: Container  
 Type of claim: Illness  
 As per 5/10/2015



● Conditions of the cardiovascular system	46.88%
● Conditions of the digestive system	10.06%
● Infectious and parasitic diseases	6.96%
● Conditions of the musculoskeletal system	6.30%
● Conditions of the respiratory system	5.67%
● Conditions of the genito-urinary system	4.87%
● Appendicitis	3.78%
● Diseases of the blood and blood-forming organs	3.18%
● Endocrine, nutritional, metabolic and immunity	2.37%
● Neoplasms	2.26%
● Conditions of the skin	2.10%
● Conditions of the nervous system	1.90%
● Mental disorders	1.63%
● Eyes	1.09%
● Ears	0.71%
● Oral health	0.23%

**Graph 7.10: Frequency per loss code – claim categories**  
**Claims 5,000–3,000,000 (USD)**

Period: 2005–2014  
 Type of vessel: Container  
 Type of claim: Illness  
 As per 5/10/2015

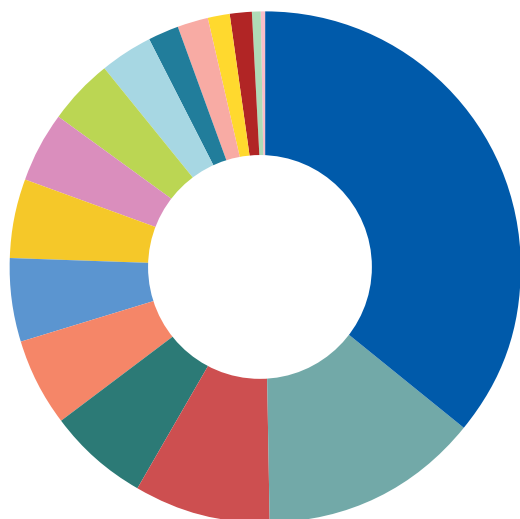


● Conditions of the cardiovascular system	29.63%
● Conditions of the musculoskeletal system	14.48%
● Conditions of the digestive system	10.10%
● Conditions of the genito-urinary system	9.09%
● Infectious and parasitic diseases	6.73%
● Conditions of the respiratory system	4.38%
● Appendicitis	4.38%
● Conditions of the skin	4.04%
● Mental disorders	3.70%
● Diseases of the blood and blood-forming organs	3.03%
● Endocrine, nutritional, metabolic and immunity	2.63%
● Neoplasms	2.63%
● Conditions of the nervous system	2.02%
● Oral health	1.01%
● Eyes	1.01%
● Multiple causes	1.01%
● Ears	0.67%

## Tankers

**Graph 7.11: Cost per loss code – claim categories**  
Claims 5,000–3,000,000 (USD)

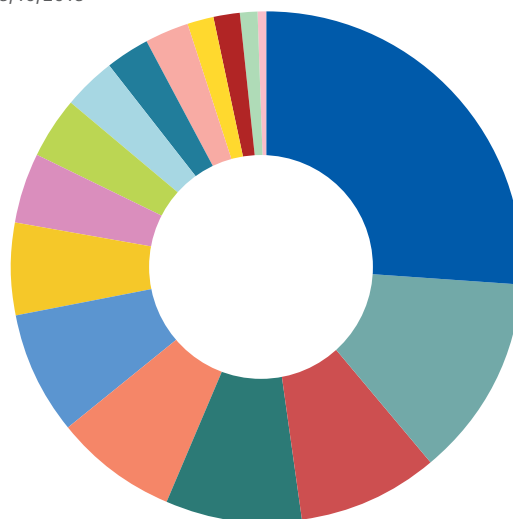
Period: 2005–2014  
Type of vessel: Tanker  
Type of claim: Illness  
As per 5/10/2015



● Conditions of the cardiovascular system	35.99%
● Conditions of the nervous system	13.84%
● Conditions of the musculoskeletal system	8.76%
● Conditions of the genito-urinary system	6.35%
● Mental disorders	5.48%
● Multiple causes	5.14%
● Conditions of the digestive system	4.99%
● Appendicitis	4.57%
● Infectious and parasitic diseases	4.22%
● Endocrine, nutritional, metabolic and immunity	3.38%
● Conditions of the respiratory system	1.85%
● Eyes	1.84%
● Conditions of the skin	1.44%
● Ears	1.34%
● Diseases of the blood and blood-forming organs	0.62%
● Hernia	0.18%

**Graph 7.12: Frequency per loss code – claim categories**  
Claims 5,000–3,000,000 (USD)

Period: 2005–2014  
Type of vessel: Tanker  
Type of claim: Illness  
As per 5/10/2015



● Conditions of the cardiovascular system	26.37%
● Conditions of the genito-urinary system	12.64%
● Conditions of the musculoskeletal system	8.79%
● Conditions of the digestive system	8.79%
● Infectious and parasitic diseases	7.69%
● Appendicitis	7.69%
● Mental disorders	6.04%
● Conditions of the respiratory system	4.40%
● Conditions of the skin	3.85%
● Multiple causes	3.30%
● Endocrine, nutritional, metabolic and immunity	2.75%
● Conditions of the nervous system	2.75%
● Diseases of the blood and blood-forming organs	1.65%
● Ears	1.65%
● Eyes	1.10%
● Hernia	0.55%

## 7.3 Illness claims

The most common illness for all three types of vessel is cardiovascular disease (or coronary heart disease), which is also the most costly. The crew cannot do much while 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 the 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.

One of the main causes of coronary heart disease is high serum cholesterol levels, which increase in men at around 45 to 50 years of age, and is very hard to prevent. This means that crew members over 45 years old run a greater risk of suffering from cardiovascular disease.

This, coupled with a predicted shortage of officers in the near future, could lead to an increase in cardiovascular disease statistics as older officers will continue to serve on board due to the difficulty of finding replacements.

It is important that shipowners are aware of the risk factors that can cause heart disease and stroke, which include raised blood pressure, high cholesterol and glucose levels, inadequate intake of fruit and vegetables, overweight, obesity, smoking and physical inactivity. Addressing these issues is essential.

Cardiovascular disease (CVD) – mainly caused by:

- Obesity
- Poor diet
- Smoking
- Physical inactivity

Risk assessments can be made by considering the following:

- Age
- Gender
- Blood pressure
- Cholesterol, including high density lipids
- Family history of CVD
- Smoking
- Diabetes
- Important to have a Pre-Engagement Medical Examination (PEME), because many things can be detected that are not work-related

### Illness claims case study 1

The crew member had smoked for around 40 years and had a valid health certificate. While he was working on board he suffered a heart attack and was rushed to hospital. In the days prior to this he had experienced shortness of breath and a rapid heart rate. At the hospital he was found to have respiratory failure and required mechanical ventilation, he had little if any respiratory reserve. The cause was diagnosed to be Chronic Obstructive Pulmonary Disease (COPD). This means that the airways become narrowed, limiting the flow of air from the lungs. The most common cause is from smoking. After a couple of weeks he was finally allowed to leave hospital and fly home to his native country to rest and receive further treatment. Unfortunately he was found dead in his home a couple of weeks later.

#### Causes:

Heavy smoking for several years. The health certificate did not identify any concerns and questions must be raised as to whether a normal health certificate is sufficient for

determining a crewmember's health. If health certificates are not treated seriously by doctors, it could lead to severe consequences, as in this case.

### Illness claims case study 2

A crew member suffered a stroke on board the vessel and was repatriated by helicopter to the nearest hospital. At the hospital he was surgically treated for three aneurysms. In addition, he suffered a complication after surgery resulting in another operation and a prolonged stay in intensive care for one month. He was finally discharged and repatriated under escort to his native country where he was immediately transferred to a specialist clinic, where intensive physical therapy was arranged. The crew member will not be fit for duty after the end of the treatment.





### Causes:

The advice stated that a cerebral aneurism can be present from birth, but can also be caused by hypertension, which the crew member had apparently been suffering from and which had been disclosed during the Pre-Engagement Medical Examination (PEME) when he was declared fit for duty.

### Illness claims case study 3

The vessel was forced to deviate as the Master was suffering from severe abdominal pain and cramps and needed hospitalisation. When arriving at hospital he was diagnosed as suffering from diverticulitis with bowel obstruction, severe dehydration and malnutrition. The doctor at the hospital stated that the Master would have died had he spent one more day at sea. The severity of illness and the time that elapsed before definite treatment could be provided resulted in five operations and major complications. The Master was finally repatriated to his native country.

### Causes:

The Master had a ten-year history of diverticulitis episodes and it was known that his present condition had commenced prior to this incident as he had seen a doctor in a previous port.

### Illness claims case study 4

The Chief Engineer was taken to hospital with heart problems and irregular blood pressure. His condition soon deteriorated and it was decided that he should be taken to a better, specialist hospital, where he was immediately taken into intensive care.

It was established that he had chronic pneumonia with very high blood pressure and his lungs were in a very bad condition. After a month in intensive care his condition improved and it was decided to try to take him by air ambulance to his native country. However his condition deteriorated and the air ambulance had to be cancelled. A similar repatriation attempt failed a couple of weeks later and the Chief Engineer passed away soon thereafter.

### Causes:

The Chief Engineer was a heavy smoker. His poor lung capacity had not been identified when his health certificate was issued.



## 7.4 PEME (Pre-Engagement Medical Examination)

To prevent illness and ensure that the crew is fit and healthy, the normal medical examination seems inadequate. It can take years of unhealthy living for a serious illness to develop as a consequence, and this is also true for many other illnesses that are not obvious in the early stages.. If the warning signs can be identified and preventative measures taken at an early stage, it is likely that this could prevent a lot of suffering and even premature death.

To this end, the Club has developed its own PEME, which is much more comprehensive than the medical examination normally required.

Two clinics in the Philippines are currently approved to carry out PEME examinations 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.

**Appendix (iv)** shows an extract from a bachelor thesis by Marcus Waserbrot demonstrating that a PEME saves cost and prevents illness.

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## 7.5 Illness – how to treat crew members

Respect for a seafarer's personal decision, in relation to recommended medical treatment, is paramount in handling cases involving personal injury or illness.

There is always a balance between maintaining respect for a decision made by an adult of sound mind (possibly based on religious or cultural determination) and the

recommendation given by a medical expert. The objective of the Club in a situation like this is to ensure that the seafarer makes an informed decision and, if required, obtains the advice of several experienced medical experts enabling him to do so. There is also the question of what constitutes a sound mind and whether the information on which the seafarer's decision is to be

made is fully recognised. It becomes particularly difficult if family members who do not have access to the same information put pressure on the member.

Usually, any situation can be resolved by reasoning and close cooperation between the parties involved, including the seafarer, the member, the family, the treating



physician and the Club. In most cases, where this delicate issue arises, the Club will utilise the network of medical experts available, to make certain that the seafarer is fully informed of the consequences any decision he may make e.g. to refuse treatment. While in the first

instance the Club respects the decision of the seafarer, at this stage it may be necessary for the Club to protect the member's interests by obtaining a declaration from the seafarer, in which he confirms that he is fully aware of the risks he is assuming by making a decision that

is against expert medical advice and recommendations given, and further that he releases the member from any liability regarding the consequences of his decision.

[Appendix \(v\)](#) examines the issue of medical confidentiality consent and disclosure in detail.

## 7.6 Prevention

Illness claims are somewhat different in nature to injury and cargo claims. To prevent illness it is essential that the company has established preventative measures, before the crew member joins the vessel, and that the company promotes healthy living on their vessels. It is also very important to have comprehensive new-hire procedures, to ensure that the new crew member is healthy. It is unfortunate that the normal health certificate appears to be insufficient and the Club believes that a more extensive health certificate is required. The best prevention is to carry out a PEME.

Of course there is also a need for procedures that ensure that all the crew in the company are healthy. Illness can strike at any time but by trying to identify problem areas and risks before they occur is good loss prevention and minimises the exposure in this respect.

- If possible complete a PEME on the crew member
- Promote healthy food and diet on board the vessel
- Help crew members to stop smoking
- Ensure alcohol consumption is limited
- Promote both physical activity on board and when home on vacation
- Have a functional gym on board the vessel



## 8 Overall preventative measures

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### 8.1 Causes

So why do accidents happen? This is always the question. While every accident is of course different, the statistics show that there are always some common mistakes and problems.

- Lack of training, both regarding company procedures and practical skills.
- Taking unnecessary risks.
- Lack of experience.
- Complacency.
- Ignoring best practices and approved procedures.
- Lack of belief in safety and over confidence in one's own ability.
- Generic company procedures which are not suitable for the vessels trade and operation.
- Lack of communication between crew members.
- Poor communication between crew and office staff.
- Not acknowledging cultural differences between nationalities, company and profession.
- Not being assertive when spotting mistakes have been made.



## 8.2 Implementing a safety culture

There are many reasons why accidents happen, and the immediate causes are often clear. However to prevent accidents from happening again the root causes need to be identified and rectified.

Most people can identify a dangerous situation, but some make the judgement that a risk is acceptable to take. We hear about these miscalculations every day in the news. The problem with a high risk appetite on a vessel is that the consequences can be serious and even fatal. Those at sea must know the risks and avoid them.

The procedures that suit your organisation or vessel will of course be individual, but it seems that companies that have implemented the following are better prepared and have reduced the risk of accidents happening:

- Senior management should ensure there are adequate assessments of operational readiness, suitable monitoring, supervisory/management job knowledge and adequate enforcement of work standards. This can be done through a good audit structure, both on board and ashore.
- The auditor should, during internal audits, verify the crew's knowledge of work permits and risk assessment.
- It is essential to physically carry out inspections and not

just fill out the associated paperwork.

- Ignorance is not acceptable, but a lack of knowledge should be corrected by further training.
- The manager should ensure that the procedures are specific when a detailed risk assessment is completed.
- The manager should implement specific training for senior officers about the importance of following the company's SMS and the consequences of disregarding procedures.
- The Master of any vessel has a huge responsibility, which includes:
  - Ensuring that crews both follow and understand the SMS
  - Encouraging the crew to inform the office about procedures that can be improved and concerns about working practices.
  - Fostering a climate on board the vessel where any crew member can raise a concern.
  - Encouraging crew members to challenge a senior officer when a mistake is made.
  - Focusing on implementing a culture of fairness.

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## 8.3 Safety culture

One of the difficulties encountered when implementing a good safety culture is that the concept of 'safety' will be defined in as many different ways as the number of different people you ask. To establish a proper safety culture is a difficult and time-consuming task, but the reward of preventing a serious accident will be worth the time and effort.

To establish a proper safety culture it is essential that there is commitment from senior management. If top management requires that all employees follow the company's safety culture, it is likely that it will be implemented correctly. In a well-functioning safety culture, most people realise the importance of procedures and are aware of the consequences of not following them. The procedures should be seen as something positive that will benefit working conditions and make them safer. This should inform the attitude of the individual so that he knows the importance of donning a safety harness, filling out a work permit correctly or following the detailed requirements of the risk assessment.

To change negative attitudes, it is imperative that all crew on board know what is expected of them. The management needs to be clear about its policies and have a defined company culture.

All employees need to have proper training demonstrating what is required of them, as new SMS procedures will most likely not be enough. The company should provide the Master with sufficient tools to ensure that the crew on board has easy access to the SMS and that they understand the importance of the procedures. It is at this point that a comprehensive and detailed SMS will be most beneficial.

This kind of attitude training is at the heart of the Maritime Resource Management (MRM) process and knowledge can be further enforced via company seminars, newsletters, Masters' reviews, and through the monthly safety meetings on board the vessel. These procedures need to be verified during internal audits and superintendent's visits.

In a positive safety culture, mistakes are allowed, but negligence and ignoring procedures are not.

It is difficult, and time consuming, to establish a positive safety culture – the payback, however, is substantial.



# 9 Conclusion

We have seen that there are usually several reasons why accidents happen and the complexity of the underlying causes sometimes makes it difficult to carry out a proper analysis. Accidents are generally caused by human error and often occur in conjunction with technical or equipment failure. Injuries and cargo claims usually occur because the crew did not follow SMS procedures. Alternatively, procedures were inadequate or simply did not address the situation in hand. The SMS includes work permits and risk assessment procedures that, if followed correctly, should be able to prevent accidents and mistakes.

When accidents occur it is often the case that crew members have ignored procedures or did not identify the risks. This may be that the crew member did not see the benefit in following the procedures. This clearly demonstrates that the company has failed to

establish a safety culture on board that emphasises the importance and benefits of approved procedures.

We can also see that over the past ten years claim costs increased in all the three categories. The claims cost interval for illness between USD 50,000-500,000 represents 60% of the cost, but the frequency is about 20%. It is similar for injuries, with a frequency of about 10%, but the costs represent 45% in the 50,000-500,000 interval. The claim interval from USD 1-5,000, for both illness and injury, amounts to about 15%, but the cost is only 2%.

Expensive cargo claims over USD 500,000 have been found to represent over 30% of the total cost but have a low frequency of 1%.

It comes as no surprise that there are some extremely expensive claims, but there is a worrying trend that the number of expensive claims is increasing. This will increase the

overall costs significantly and we are monitoring the statistics closely.

In this publication one of the recurring problems we have identified is that proper procedures have not been put in place or those procedures that do exist have not been followed correctly. It is beneficial to continuously verify within your organisation that all high-risk operations have been properly identified and that preventative measures have been implemented.

You must ask yourself whether your crew members and office staff believe in your loss prevention programme or do they just tick the boxes? It is a difficult and time consuming job to implement an efficient safety culture in your company, but as we highlight in this publication, safety improvements are not about spending great amounts of money, but prove cost efficient when compared with a catastrophe, not to mention the avoidance of human tragedy.



# 10 Appendices

## Appendix (i)

### Ship fires – causing large cargo claims

#### Introduction

The risk of fires on board vessels is fortunately not very common as we can see from the statistics, but when fire does break out the consequences can be severe, and this can lead to tragic outcomes such as loss of life and also large cargo claims. The risk of a fire happening is something every seafarer is aware of and trained to respond to. When at sea there is no fire brigade that can assist and it is only the knowledge of the crew and the equipment on board that will protect the vessel and crew from disaster.



## Prevention

### Engine room fires:

Prevention is best achieved by preventing any leak in the first place and is best served by ensuring that engineers and oilers are properly trained and supervised when undertaking their work and that work is checked on completion. This good maintenance practice should, of course, extend to work being carried out on all heat producing equipment in the engine room. Boilers and incinerators, for example, also have that dangerous mix of available fuel and a good ignition source.

### Electrical fires:

Engine room training, supervision and checking protocols can help reduce the likelihood of a fire occurring, and if the latter, properly planned maintenance and monitoring, including the use of thermal imaging, can identify developing faults before they become too serious.

### Hot work:

In many cases this combustible material is waste, such as rags (oily or otherwise). As these can be readily ignited by even relatively weak sources of ignition, such as a lit cigarette butt, it goes without saying that good housekeeping in an engine room is an essential.

The paper, *Ship fires* from the late Dr Eric Mullen highlights the most common immediate causes, but also what needs to be done to prevent fires from happening. These causes are nothing new, but fires still happen, and in recent years there have been some extremely serious fires. Some of these fires have been caused by wrongly declared

container cargo, a situation which concerns the entire industry. However, at the time of any incident it doesn't matter who was at fault - the fire needs to be extinguished.

The importance of following good working practices is essential in preventing fires.





## Ship fires

Eric Mullen

As with any fire, ship fires can happen almost anywhere and at any time. Sometimes a Master has little or no control of a fire breaking out; imagine, for example, a fire following a collision or pirate attack. The most common areas where fires occur are engine rooms, accommodation blocks and in cargo, which will be mentioned in turn.

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### 1. Engine room fires

By far the most common cause of fires in engine rooms is fuel spray igniting on hot surfaces. Oil spray often occurs at purifiers, main engines and most commonly, at auxiliary engines. The fuel spray can be heavy fuel oil, diesel or lubricating oil. Although fuel lines and couplings can fail spontaneously, it is more common that the leak occurs shortly after maintenance has been carried out, or while being carried out. This can range from simply turning a three-way valve on a fuel filter the wrong way, at the wrong time, to over-tightening or under-tightening nuts or physically damaging pipelines. Spray from engine room equipment can be at relatively high pressures and can spray many metres from the source of the leak. Almost invariably there is a hot exhaust or some other hot surface nearby. Typically, these can be at a temperature greater than the auto ignition temperature of the sprayed liquid, resulting in a fire.

There is a SOLAS requirement for exhaust systems, and other hot surfaces, to be adequately shielded, but this is predominantly a matter of preventing injury and in practice it is difficult to make coverings around exhausts and turbochargers liquid tight when subjected to prolonged exposure to large quantities of liquid. Moreover, fine mists of hot liquid fuels can be ignited by other sources, such as sparks or hot surfaces in electrical equipment. Hence, prevention is best directed to not having the leak in the first place, and is best served by ensuring that the engineers and oilers are properly trained and supervised when undertaking their work and that work is checked on completion. This good maintenance practice should, of course, extend to work being carried out on all heat producing equipment in the engine room. Boilers and incinerators, for example, also have that heady mix of available fuel and a good ignition source.

### Electrical fires

The presence of electrical panels and equipment in engine rooms means that, on occasion, electrical fires can occur. In our experience, these are mercifully rare. Sometimes they are the result of repair and maintenance work being carried out, and sometimes a consequence of component failure. If the former, the same engine room training, supervision and checking protocols can help reduce the likelihood of a fire occurring, and if the latter, properly planned maintenance and monitoring, including the use of thermal imaging, can identify developing faults before they become too serious.

### Hot work

Hot work is a potent source of ignition, be it welding, cutting or grinding. Where possible, the work piece should be taken to a safe area for working on, but in cases where this is not possible, care needs to be taken that combustible material in and around the work area is removed or shielded. In many cases this combustible material is waste, such as rags, oily or otherwise. As these can be readily ignited by even relatively weak sources of ignition, such as a lit cigarette butt, it goes without saying that good housekeeping in an engine room is always not only preferable, it is a must.

### Checking equipment

The vessels SMS (Safety Management System) provides a good basis on which to monitor maintenance checking of equipment. But beware, the checks need checking as we know of cases where the paperwork sent to the office has the requisite box ticked but the actual repair, on say a fuel system, was deferred because the engineers were "a bit busy" just then.

## 2. Accommodation fires

Accommodation fires are generally similar to those found in any dwelling and are most commonly the result of either an electrical fault, or human factor, whether accidental or deliberate. Accidental human factor fires are usually caused by the careless disposal of smokers' materials but can also be the result of any facet of being human, like leaving fat filled pans on galley stoves, leaving combustible materials too near heaters. Deliberate fires are typically the result of ill will amongst the crew or a disaffected crewman. Good housekeeping, checks on equipment in cabins and a watchful eye on the wellbeing of the crew are the best ways of preventing such fires.

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## 3. Cargo fires

A Master has some measure of control over the loading of bulk cargo and can take steps to prevent any fires. The most common causes of fire in agricultural and general product cargoes are the careless disposal of smokers' materials, often by stevedores who are notorious for both open and clandestine smoking; cargo lights being left on; and problems with fumigants.

### Self-heating

In some cases self-heating can lead to a fire, but this is relatively uncommon. Vigilance and good working practices when loading are the key to fire prevention of these cargoes; these should extend to any hot work carried out in the way of part filled or full cargo holds. Self-heating in cargo such as coal, can potentially lead to a fire. By far the most effective means of preventing such fires is to rigorously adhere to the requirements of the International Maritime Solid Bulk Cargoes Code (IMSBC) during and after loading.

### Containerized cargo

Regrettably, there is much less that a Master can do in relation to containerized cargo. Misdeclaration of a container's contents is very common and, of course, the ones misdeclared are often the ones most likely to cause a problem. It is often the case that a Master is given

only the Dangerous Goods Manifest and, in any event, it is unreasonable to expect him to review and verify the declared contents of every container on the vessel. In practice there is little more a Master can do other than ensure that those dangerous goods he does know about are carried in accordance with the IMDG Code and that proper checks of the containers are carried out during the voyage.

### Oil and chemical tankers

These present their own challenges, as many of the cargoes are flammable and hence liable to fires and explosions. It is no secret that the greatest risks are when loading and unloading, as it is then that there is the greatest likelihood of there being spillage of liquid or vapours from the cargo or there being a flammable mixture of cargo vapours in the tanks, equipment running and crewmen working on deck. Sources of ignition include running motors and pumps that can provide both electrical and mechanical sparks and heating, static electricity, mechanical sparks as a result of dropped tools or inappropriate footwear and the use of unauthorised or damaged equipment.

### Tank cleaning

Tank cleaning, especially if being carried out manually, presents its own risks, as there is a potential for ignition by static electricity during water hose washing, steaming, mechanical sparks or the use of inappropriate lighting.



### Preventative measures against fires

The occurrence of fires and explosions in tankers can be greatly reduced by following the International Safety Guide for Tankers & Terminals (ISGOTT) but, as with all fires, proper maintenance of equipment and ensuring safe working practices go a long way to preventing incidents. In short, it is not possible to prevent fires on vessels entirely; some events are beyond a Master's control.

Nevertheless, most fires are preventable by means that are well understood and can be summarised as good working practice.

- Ensure that the engineers and oilers are properly trained and supervised when undertaking their work and that work is checked on completion so that any problems can be detected and rectified.
- Carry out proper planned maintenance and monitoring, including the use of thermal imaging, in order to identify developing faults before they become too serious.
- During hot work ensure no combustible material is around the work area or that it is shielded.
- Keep good housekeeping in the engine room, no waste or rags.
- Carry out inspections to ensure there is good housekeeping in the accommodation and especially galley. No pans with oils, no dangerous material in lockers or cabins.
- Carry out a two person check to ensure that the filled out checklist has been adhered to.
- Follow the IMDG and IMSBC Code rigorously.
- On a container vessel the Master should ensure that those dangerous goods he does know about are carried in accordance with the IMDG Code and that proper checks of the containers are carried out during the voyage.
- Make sure there are no sources of ignition on open decks, such as running motors and pumps, that can provide both electrical and mechanical sparks and heating, static electricity, mechanical sparks as a result of dropped tools or inappropriate footwear and the use of unauthorised or damaged equipment.
- Ensure that the fire detection system is fully operational.

As Dr Mullen mentions, it is not only important to have the correct procedures for preventing fires, there must also be checks that ensure that these procedures are followed. This is best done during internal audits and when a superintendent is visiting the vessel.



## Appendix (ii)

**Bulk liquid chemicals and fuels: Insight into specifications and contaminations.  
Detrimental changes to liquid chemicals and fuels during transport.**

Dr Wesley Tucker, Consultant Scientist, TSC Scientific.

### The problem

Liquid cargoes are inherently vulnerable to changes in composition through interaction with their surroundings as they have the potential to become damaged or absorb contaminants. This is especially true at the interface between cargo and tank, with many issues arising from things such as coatings, temperature, compatibility, cleaning and inerting. Problems can occur for inorganic (i.e. ammonia), organic (i.e. benzene) and aqueous (i.e. hydrochloric acid) cargoes alike, but are much more prevalent for purified organic chemicals and fuels which are strong solvents, corrosive, predisposed to oxidation, or shipped in non-dedicated tanks. Importantly, the issue can arise from the shore tank, piping, or vessel,

thus making an investigation a complex assessment of the entire process from production lot to receiver.

When it comes to changes in a liquid cargo during a voyage, it may be important to first make a distinction between a contamination and an off-specification. A contamination is a tainting of the cargo with a foreign material, and may or may not reveal itself in the panel of tests that define product specifications. Alternatively, an off-specification is the failure of a material to fall within a set range of test values, and may or may not be related to a contamination. In other words, failure to meet specification is not always related to contamination and vice versa.





Because of this, contamination may possibly go unnoticed, while an off-specification likely will not, unless there is a problem with the testing, as will be described in this article.

The amount of contaminant (i.e. from coatings or seawater) or damaged product (i.e. from degradation or oxidation) required to cause off-specifications or become otherwise noticeable varies greatly depending on the cargo and its context. For example, to cause a hypothetical cargo of 1000 MT pure vinyl chloride monomer, or VCM, a plastics ingredient, to fail specification for non-volatile residue (often set at 15 ppm), 15 kg of residue from sources such as rust or paint would need to be suspended in the tank while representative sampling occurred. Similarly, for the same hypothetical cargo of pure vinyl mono chloride to fail specification for the precursor compound ethylene dichloride, or EDC (often set at 5 ppm), around four litres of EDC would need to be introduced into the cargo. In perhaps a more alarming example, it is possible that less than one litre of fuel oil could cause a hypothetical 1000 MT of benzene to fail specification for sulphur (often set at 1 ppm).

## The cause

The cause of contamination or off-specification can be influenced by many factors and often more than one is relevant in an investigation. Contamination is sometimes caused by things such as rust, coatings, residuals in piping, remnants of previous cargoes in the tank, water ingress, and biological growth. Off-specifications that are not due to contamination, on the other hand, can be caused by changes in the chemistry of the material such as degradation, oxidation, and polymerization.

Helping to determine cause, contractual specifications for chemicals are designed to be specific to the properties of that material and are often geared towards monitoring suspected vestiges of production, storage, and transport. Additionally, specifications for fuels often include parameters relating to performance and emissions. Regardless, most of the root causes of off-specifications and contaminations are shared between the two cargo categories of fuels and chemicals, and whatever the commodity and cause of damage may be, careful sampling and laboratory tests are required to understand the situation, so a fair conclusion can be reached.

## Cargo sampling

When it comes to liquid cargo disputes, it is easy for cargo interests to have the upper hand due to their access to shore tank samples from loading and discharge ports. In order to protect the ship from false judgments, it is always highly advised for crews to take samples from the manifold, first foot, and final tank during loading, and manifold and tank samples at discharge. The information gained from these samples can protectively aid in the fair determination of cause. Clean closed sampling systems and cargo appropriate sample vessels should be used, and tank samples should be taken in zones. Sample sizes exceeding one litre are most often sufficient for repeated testing, but because of the cargo specific nature of specifications, due diligence regarding the sum of test sample volumes is advised. Finally, it goes without saying that crews should be trained and aware of details such as careful labelling, recorded storage, and judicious invitations for other parties to join in the sampling.

## Cargo testing

Once samples are obtained, parties look to major analytical laboratories to serve their testing. What is often overlooked, however, are the many nuances associated with the tests for which results are too often taken at face value. Several key points should be realised by parties that seek judgment of their cargo samples:

1. Different test methods used to test the same parameter are not considered interchangeable. The values produced by the different protocols are therefore not meant to be directly comparable. This is due to the fact that not only can test methods differ in their technique and technology, but also vary greatly in their specificity, scope, sensitivity, and precision. For the values produced by two different test methods to be comparable, a study must be performed to evaluate how much the results from shared samples agree with each other. The importance of transparency in the methodologies reported on test certificates can easily be understood from this, and it is easy to see why a final round of joint testing is often required.
2. All test methods have inherent error. When test methods are developed and validated, the inter-laboratory precision, or reproducibility, is often characterised. This is important because test values that happen to fall near a specification threshold have an associated repeatability, which brings in to question the 'true' value. In such a situation it may be

- worthwhile to retest, and specialist interpretation may be required to decide what the reported values really indicate.
3. Not all labs are created equal. While it is unfair to prejudge a laboratory based on geographical location, it can be said that it is sometimes better to ship samples to another place with a more reputable lab. In fact, it may be said that laboratories vary wildly in their quality and capacity, with language and cultural factors further complicating the choosing of labs. When it comes to lab vetting, it may be wise to consider having a specialist perform due diligence for sourcing a quality lab, or sending them as a witness if quality cannot be verified remotely.

As seen here, the qualification of commodities has many features that lend themselves to interpretation and decision-making. If we assume that sampling was representative, then we may say that testing is the most important tool in judging a dispute objectively.

To bring together some of the above points, let us refer back to the two cargoes exemplified in the opening of the article, Vinyl Chloride Monomer (VCM) and Ethylene Dichloride (EDC), which were chosen as examples because they are commonly shipped and related in properties and origin. As seen in the below table, the two chemicals have a similar but different panel of associated specifications.

VCM			EDC		
<b>Purity</b>	99.98	%	<b>Purity</b>	99.99	%
<b>Water</b>	100	ppm	<b>Water</b>	50	ppm
<b>Appearance</b>	Clear Colourless	N/A	<b>Colour</b>	10	Alpha
<b>Acidity</b>	1	ppm	<b>Acidity</b>	2	ppm
<b>Iron</b>	0.5	ppm	<b>Iron</b>	1	ppm
<b>Non-volatile Residue</b>	15	ppm	<b>Non-volatile Residue</b>	20	ppm
<b>Methyl Chloride</b>	80	ppm	<b>Total High Boilers</b>	450	ppm
<b>1.3 - Butadiene</b>	10	ppm	<b>Total Low Boilers</b>	450	ppm
<b>Ethylene Dichloride</b>	5	ppm	<b>Density</b>	1.258-1.268	g/ml

When we compare the two cargoes we see that they share some contamination related specifications such as appearance, iron, non-volatile residue, and acidity, while some are chemical specific and related to precursors and degradation such as methyl chloride and ethylene dichloride. One may also notice that colour or appearance is an important specification on many chemical cargoes, which is intended as a way of alerting the presence of contamination.

We can exemplify a problem by revisiting our hypothetical situation of a VCM cargo becoming off-specification for EDC, and propose that test certificates at discharge report EDC levels of 7 ppm while those at loading report 1 ppm. Let's also propose that methods used to derive these values are only mentioned in the discharge certificates and are national in origin. When referring to the parameter of EDC in the VCM specifications above, we find that a change in the cargo is implied to have taken place during shipment. Even so, situations such as these often raise more questions than answers and may require a more authoritative round of joint testing to settle dispute. For instance, this proposed situation begs the following questions:

#### **What methods were used at loading?**

Results obtained from discharge listed national test methods, which implies that different methods were used at loading, making the values from the two locations non-comparable without a careful assessment.

#### **What is the reproducibility of the methods used at loading and discharge?**

Perhaps if tested again the discharge samples would be within specification. Similarly, maybe the cargo would fail specification if the loading samples were re-tested. Test methods that do not have their reproducibility determined are not fully developed.

#### **How specific is the test method?**

In the above table we see that methyl chloride, another chemical of similar properties, is included in the tests and could conceivably be 'picked up' by the test for EDC as a source of error. A quality test method would include a characterization of specificity so this could be better judged.

#### **What is the sensitivity of this method?**

Detection levels must be within an acceptably repeatable range for the method, otherwise a quantitative result is not valid. Again, a quality test method would include a description of sensitivity.

#### **What laboratory will be used?**

Phone calls with the analyst(s) handling the samples or in-person test witnessing can be conducted by a specialist to verify the quality of the procedure.

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## **Conclusion**

Ultimately, it is the environment around the cargo that decides if changes occur, and therefore many off-specifications or contaminations can be prevented if ideal conditions are always provided. Careful adherence to inerting procedures, strict observance of epoxy curing protocols, meticulous tank cleaning, due diligence for cargo compatibility, and other precautions help to prevent incidences. Nevertheless, many situations are not under the control of crews and their management, and a fair determination of cause is a must once a dispute arises. As we have illustrated here, problems associated with cargo specifications are nuanced and require careful consideration. Involved parties should be critical of the way bulk liquids are judged without being assuming or dismissive. When a problem does occur in spite of crew foresight, and when in doubt about the above mentioned dispute features, a specialist may be necessary to help in interpreting the situation.



## Appendix (iii)

### Specific issues with stevedores in the USA

Keith Letourneau

Stevedore work in the United States can easily create personal injury liability exposure for an unwary shipowner. The leading United States Supreme Court case setting forth the obligations of a vessel owner is *Scindia Steam Navigation Co. v. De Los Santos*, 451 U.S. 156 (1981). *Scindia* stands for two important propositions.

Firstly, as a general matter, the shipowner may rely upon the stevedore to avoid exposing stevedores to unreasonable hazards. However, under U.S. maritime law and the U.S. Longshore and Harbor Workers Compensation Act ("LHWCA"), a shipowner cannot recover against a stevedore employer for any injuries that occur to a stevedore. Moreover, in the event that the shipowner breaches one of its duties to the stevedore resulting in injury, the stevedore can sue the shipowner for negligence. Under joint and several liability principles that apply pursuant to U.S. maritime law, if we hypothesize that the shipowner is 10% at fault, the stevedore 20%, and the stevedore employer 70%, the shipowner nonetheless would be responsible for 80% of the damages awarded.

This result follows because joint and several liability principles under U.S. maritime law shift the risk of uncollectibility from an innocent plaintiff to a culpable tortfeasor. The LHWCA's compensation bar essentially transforms the stevedore into a judgment proof defendant. Additionally, the stevedore's worker's compensation carrier generally intervenes in any suit against shipowners or charterers to recover medical care costs expended on the stevedore's behalf. Consequently, the shipowner, rather than the stevedore employer, bears the brunt of fault attributable to the stevedore, despite *Scindia*'s first proposition. Secondly, *Scindia* holds that the shipowner, the stevedore employer, and his stevedore employees the duty of exercising due care under the circumstances. Thus, while the primary responsibility for the stevedore's safety ostensibly rests with the stevedore's employer, the shipowner also owes a standard of care to the stevedore. That standard encompasses three duties to stevedore servicing the vessel:

1. The 'Turnover Duty'
2. The 'Active Control Duty'
3. The 'Duty to Intervene'

#### 1. The 'Turnover Duty'

The 'Turnover Duty' requires the shipowner to furnish a reasonably safe ship, and to warn the stevedores of hazards from gear, equipment, tools and the workspace to be used during cargo operations "that are known to the ship or should be known to it in the exercise of reasonable care." However, the shipowner is not obligated to warn the stevedores about hazards that are open and obvious, or dangers that "a reasonably competent stevedore should anticipate encountering." For example, in a recent case, the Fifth Circuit Court of Appeals (which governs federal proceedings in Texas, Louisiana and Mississippi) found that a stevedore, who was injured because of an open and obvious defect in a stow of steel coils in the cargo hold, could not recover against the shipowner, operator or charterer. In that case, one of the steel coils fell from atop the stow onto the stevedore resulting in the loss of a leg. The court found that a "vessel owner has no legal duty to prevent or alleviate an unsafe condition in the cargo hold resulting from an improper stow when the condition is open and obvious to the stevedore workers."

#### Preventative measures

Shipowners may wish to consider some preventative measures before arriving in a US port. To ward off potential liability exposure in the event a stevedore claims injury, shipowners may be able to satisfy their Turnover Duty obligations through the use of a checklist identifying potentially hazardous conditions, perhaps coupled with a simple vessel diagram showing the main deck, cargo holds and other areas where the stevedores are scheduled to work. Prior to the vessel's arrival in port, one of vessel's officers should carefully inspect each of these areas, and note on the checklist any potentially hazardous conditions, for example, with respect to hatchways, latches, ladders, lighting, twist locks, wires, cables, equipment lying about, rusty conditions of deck and handhold surfaces, etc. The checklist could note where any repairs are being conducted, and the scope of the project (to place the stevedore on notice of not only where repair work is ongoing, but where repair work is being considered). Provided vessel workspaces are in good condition, it may make sense to take a series of digital photographs of the spaces where stevedores will work, including access ladders, to document the condition during

the pre-arrival walk through. To complete the turnover process, upon arrival in port, the chief mate could present the checklist to the stevedore foreman, and the two could walk the vessel where the stevedores will work noting any areas of concern.

If the vessel provides any equipment employed during stevedore work, for example, twist locks, lashing chains, hooks, etc., such equipment should be regularly inspected, serviced, and replaced as necessary, with documentation provided (or perhaps at least made available) to the stevedores evidencing the condition of such equipment at the start of stevedore operations.

## 2. The 'Active Control Duty'

The 'Active Control Duty' is breached if the shipowner "actively involves itself in the cargo operations and negligently injures a stevedore" or "if it fails to exercise due care to avoid exposing stevedores to harm from hazards they may encounter in areas, or from equipment, under the active control of the vessel during the stevedoring operation.

### Preventative measures

Before stevedore activities commence, the Master or Chief Mate may wish to instruct the crew to stay completely clear of loading or unloading operations, leaving such work to the stevedore gangs. By doing so, shipowners may avoid the 'Active Control Duty' in its entirety.

## 3. The 'Duty to Intervene'

Lastly, under the 'Duty to Intervene', a shipowner owes a duty to intervene if "contract provision, positive law, or custom" dictates "by way of supervision or inspection [that the shipowner] exercise reasonable care to discover dangerous conditions that develop within the confines of the cargo operations that are assigned to the stevedore."

The 'Duty to Intervene' may be implicated if the Master or Chief Officer is contractually obligated to supervise cargo operations, or if vessel equipment used during such operations is not operating properly, for example, ship's winches or cranes.

### Preventative measures

Numerous accidents have occurred over the years involving vessel cranes while operated by stevedores. Generally, such cases have involved the failure to properly maintain crane components and equipment in good operating order. Shipowners should consider tasking their technical superintendents to ensure that ship's cranes are regularly inspected and serviced, and current on all class certifications.

Often times, the charter agreement allocates responsibilities for cargo stowage to the charterer "under the Master's supervision," and sometimes the vessel owner and charterer have entered into an Inter-Club Agreement, or incorporated it by reference into the charter. These arrangements may affect how a case brought by the stevedore against both the shipowner and charterer will be defended, but do not necessarily alter whether the stevedore may bring suit against both parties in the first instance. To avoid assisting the stevedore by pointing fingers at each other, it is important at the inception of such a suit, to work out the defence arrangements between shipowner and charterer if at all possible. The shipowner's duty to intervene does not extend to open and obvious transitory conditions:

1. created entirely by the stevedore
2. under its control, or
3. relating wholly to the stevedore's own gear and operations

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## Summary

In summary, while the stevedoring company is purportedly the party primarily responsible for the safety of the stevedore in the USA, in the event of an accident resulting in personal injury or death, owners face considerable liability exposure should the vessel breach one of the three Scindia duties (Turnover, Active Control, or Duty to Intervene), especially because any liability of the stevedore company is attributable to the culpable defendant(s) under U.S. maritime law. The best method to obviate such liability is to institute regular procedures to satisfy or avoid breaching these duties: inspect vessel equipment and spaces; document any potentially hazardous conditions; convey this information to the stevedore prior to commencing cargo operations; stay out of active cargo operations; and service and inspect the ship's cranes regularly.

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## Preventative measures specific for USA

- The Master or Chief Officer may wish to instruct the crew to stay completely clear of loading or unloading operations, leaving such work to the stevedore gangs so the 'Active Control Duty' is not breached.
- The 'Duty to Intervene' may be implicated if the Master or Chief Officer is contractually obligated to supervise cargo operations, or if vessel equipment used during such operations is not operating properly, for example, ship's winches or cranes.

# Appendix (iv)

## Why PEME?

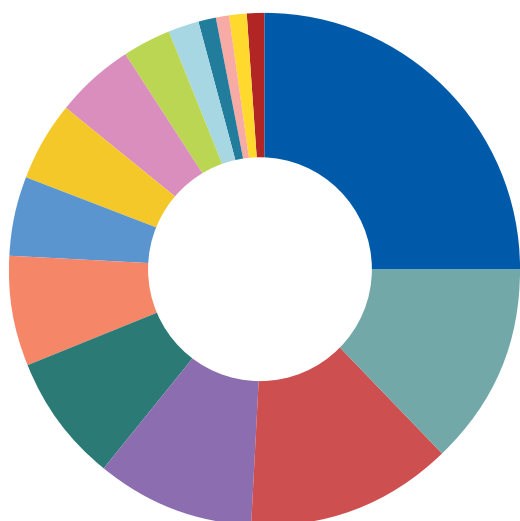
The following is an extract from a bachelor thesis by Marcus Waserbrot at Chalmers University regarding Pre-Engagement Medical Examination (PEME). From this thesis we can see that having a PEME will save cost and prevent illnesses. The thesis compared regular government required medical examinations in the Philippines compared with The Swedish Club's PEME carried out at two approved clinics in the Philippines.

In one case a crew member suffered from unspecified intestinal obstruction along with other conditions such as dehydration and hypertension and was air lifted from the vessel. The doctor stated that it was likely that the crew member would have died if he had stayed one more day on the vessel. Furthermore the doctor believed that a thorough PEME would have found that the crew member had a serious medical condition. As a result, the claim's total cost arose to approximately USD 600,000.

### Graph 10.1 Most common medical conditions for not complying with PEME

Limit: USD claims 1 - uncapped

Period: 2011-2014  
 Type of vessel: All vessel types  
 Type of claim: Illness



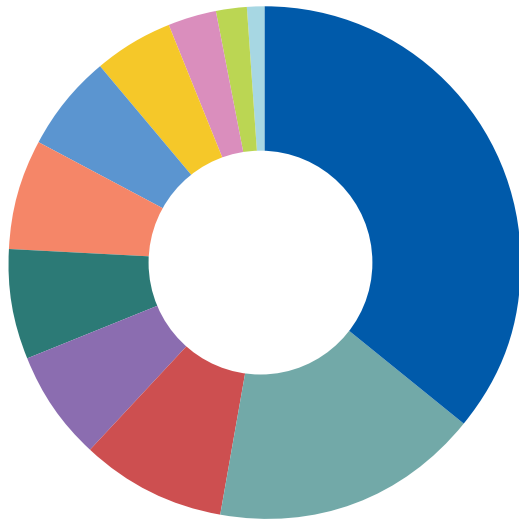
● Gallstone/polyps	25%
● Kidney	13%
● Other	13%
● Cardiovascular disease	10%
● Diabetes	8%
● Hepatitis	7%
● Elevated BMI	5%
● Liver function	5%
● Hypertension	5%
● Hearing defect	3%
● Hyperuricemia	2%
● Positive drug test	1%
● Dental issues	1%
● Pulmonary tuberculosis	1%
● Bronchial asthma	1%

From the graph to the left, the most common reasons for not being in compliance with The Swedish Club's PEME is related to gallstone or gall polyps and kidney conditions such as kidney stones or kidney disease. The third most common reason, called other, includes various types of medical conditions with low frequency that could not be categorised in remaining categories. In this case, cardiovascular disease could be seen as the second largest category if it would be combined with hypertension, which also is a condition of the cardiovascular system. Furthermore, claims related to conditions of the cardiovascular are the claim category with the highest frequency for illness claims, which also has a higher average claim cost at USD 47,115 in relation to other illness claim categories.

**Graph 10.2 Not complying with TSC PEME but would pass a government required medical examination**

Limit: USD claims 1 - uncapped

Period: 2011-2014  
 Type of vessel: All vessel types  
 Type of claim: Illness



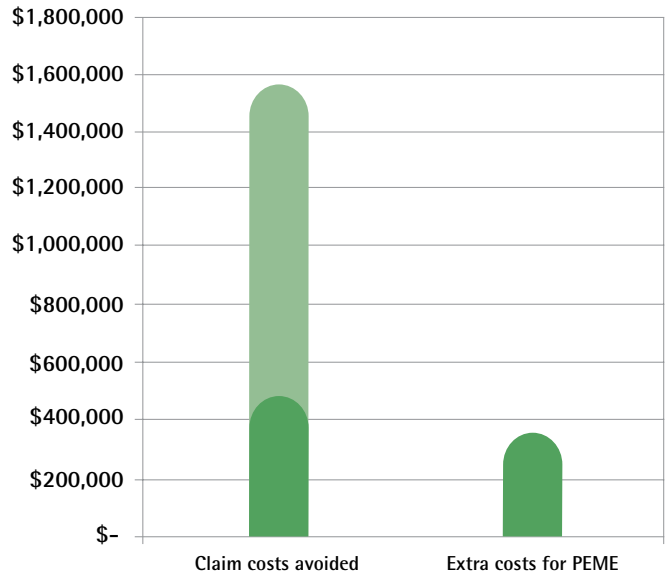
- Gallstone/polyps 36%
- Kidney 17%
- Diabetes 9%
- Liver function 7%
- Elevated BMI 7%
- Hypertension 7%
- Other 6%
- Hepatitis 5%
- Hyperuricemia 3%
- Positive drug test 2%
- Cardiovascular disease 1%

The graph above describe the most common conditions that would not be in compliance with The Swedish Club's PEME, but which would have passed a government required medical examination. The most common conditions are gallstones followed by kidney conditions and diabetes.

**Graph 10.3 Not complying with TSC PEME but would pass a government required medical examination**

Limit: USD claims 1 - uncapped

Period: 2011-2014  
 Type of vessel: All vessel types  
 Type of claim: Illness



The graph above shows claim cost avoided and the cost for PEME. The claim cost avoided is the cost saved because PEME would have detected the medical condition and the government examination would not.

The calculation is the following,

Claim costs avoided more than = USD 1,550,000

Extra costs for PEME is about = USD 300,000 (this is the extra cost for the PEME compared to the government examination)

Total cost benefit for the period 2011-2014 = 1,550,000 – 300,000 = USD 1,250,000

As a result, the avoided claims costs are greater than the increased PEME costs. In addition, the total avoided deductible is greater than the increased PEME cost, which means that the enhanced PEME has a direct cost beneficial impact to the member alone.

This once again emphasizes the importance and benefit of having PEME.

# Appendix (v)

## Medical confidentiality, consent and disclosure

Nigel Griffiths

All the classic codes of medical practice imply some qualification of an absolute duty of professional secrecy, that medical matters disclosed in confidence, should not be disclosed generally. Depending on the country in which the seafarer is hospitalised, jurisdictional issues surface as to how confidentiality is addressed. A general common law duty is imposed on a doctor to respect the confidences of his patient.

In an age of computerisation, progression of medical information to be regarded as 'data,' subjects it to data laws. Further, disclosure may be seen as breaching the 'right to respect for private life' as contained in, for example Article 8 of the European Convention on Human Rights.

Specific statutes exist in many countries whose laws have originated from the Napoleonic Code (France, Benelux, etc.), and there, medical information is treated as sacrosanct by the medical professional with an almost absolute imperative on non-disclosure. It is in these countries that clubs perhaps encounter the most resistance to disclosure and have the most difficulty in establishing what is wrong with the seafarer and his clinical management.

There are three exceptions, so let us look at the exceptions to the rule and how confidentiality can be addressed in the context of the hospitalised seafarer.

1. Clearly, if a seafarer has given his consent to disclosure of medical information then it is reasonable for such information to be passed on. The first instrument in obtaining the consent to release is to request that the patient himself (if he is able, or the next of kin if not) signs a declaration that he has no objection to the passing of information to specified parties, which may include the correspondent, ship owner, club or their medical adviser. With this release, a copy retained by the patient, a second by the hospital and the third by the agent, medical information may be forthcoming. However, in some instances, even though the consent to disclosure is obtained, that hospital may well be reluctant to pass on the information to non-professionals and it is at this juncture that clubs should appoint their medical advisers to intercede on their behalf. This is especially so in the jurisdictions mentioned, if the patient is extremely ill (when the concern is that an agent would be unable to handle the information), if the information is sensitive, and even more so if it involves a diagnosis such as HIV or AIDS.

2. Sharing of information with others providing care, or for the continuation of care. It is generally accepted that medical information will need to be passed to those organising ongoing or follow-up care in the patient's own country, or those associated with organising the seafarer's repatriation to his homeland. Whilst treating doctors may obtain consent to disclose from the patient directly if possible, inter-disciplinary dialogue is seen as appropriate and necessary for the continuity of care. In the UK the General Medical Council recognises this in permitting the sharing of information with other practitioners who assume responsibility for clinical management of the patient, and to the extent that the doctor deems it necessary for the performance of their particular duties, with other care professionals who are collaborating with the doctor in his patient's management.

3. Other reasons for disclosure:

- When communicable/infectious diseases are diagnosed in accordance with public health law, including mandatory reporting
- On the direction of a Judge for judicial proceedings
- When direct identifiable threat to life or serious harm is made evident to medical professionals by mentally ill patients

There are cases when the patient refuses medical treatment. It could be that a foot has to be amputated for the well-being of the patient but that the patient refuses. If emergency surgery or other life-saving treatment is required, every attempt should be made to reason with the patient and obtain the proper consent in writing. There will be times when consent cannot be obtained, for example when the patient is unconscious. In such instances the doctor is bound to follow the best interest factor in determining treatment, from which a substituted judgment must serve as the basis of consent. The weight of the family's opinion, whilst valuable, if they are thousands of miles away may not be sufficiently informed to override the best interest.

If a seafarer refuses to follow medical advice, it is very important that this is documented and is brought to the member's/ Club's attention immediately. If seafarers request an alternative treatment to that recommended by the doctor, this should be carefully considered and brought to the Club's attention. Terms of treatment, whilst not wishing to encroach on the patient's autonomy, treatment must also be in keeping with terms of the Club for reimbursement to the



member. Generally speaking, a patient should be stabilised in the port of incident and treated in his own country for ongoing care and not long term in the port of incident.

Unnecessary and costly investigations should also be avoided, and doctors reassured that stabilisation is their goal and not long-term care. The Club has excellent advice regarding suitable facilities in the countries that seafarers come from, and if facilities are not available there then alternative arrangements can be made.

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## Conclusion

It is prudent to have consent to release documents to be signed by the patient (or next of kin) in the first instance, and if difficulty is still encountered, then the Club's medical adviser should be appointed, to obtain the necessary information and handle in accordance with his own professional code of ethics.

- Obtain the consent to release information about the patient himself (or the next of kin if he is not able).
- The patient signs a declaration that he has no objection to the passing of information to specified parties, which may include the correspondent, shipowner, the Club or their medical advisor.
- If a seafarer refuses to follow medical advice, it is very important that this is documented and is brought to the member's/ Club's attention immediately.
- If seafarers request an alternative treatment to that recommended by the doctor, this should be carefully considered and brought to the Club's attention.
- Treatment must also be in keeping with terms of the Club for reimbursement to the member. Generally speaking, a patient should be stabilised in the port of incident and treated in his own country for ongoing care and not long term in the port of incident.
- Unnecessary and costly investigations should also be avoided, and doctors reassured that stabilisation is their goal and not long-term care.

## 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.



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