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Standard Safety

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The Standard
for service and security

The Standard

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In this edition

Welcome to a new edition of Standard Safety.

In this edition, we combine safety advice for seafarers and ship managers with an update on the activities of the loss prevention department. Each of the articles in this edition reflects a key area of concern for the club, based on the claims we are notified of and the issues we know that our members face.

The first article in this edition covers the successful completion of our 'Spot the Hazard' competition. The final step was to create a safety poster for display on board ships to help maintain awareness about the hazards faced by seafarers during their day-to-day activities on board.

The second article in this publication explains the benefits and the possible obstacles preventing effective near-miss reporting. This has been an area of concern for the club for some time, as our regular member and ship visits have revealed that many seafarers are still not familiar with the benefits of near-miss reporting. In order to emphasise the importance of near-miss reporting, we are working together with our partners CHIRP and VideoTel in producing safety videos to encourage its integration into normal working procedures.

Our two previous *Standard Safety* publications included the first and second in a series of articles on breaking the error chain. In the third and final article, we will look at two claims where a proper risk assessment could have avoided a cargo overflow and a total loss.

Seafarers are generally familiar with the hazards associated with coal or grain cargoes, but the hazards of NPK fertilisers are less well known. Richard Bell explains the potential for self-sustained decomposition of this cargo and the disastrous effects.

We continue our series on the MARPOL annexes with articles on Annex IV and V concerning the prevention of pollution by sewage and garbage. We have noticed an increasing number of ships being arrested by Port State Control because of deficiencies related to their sewage equipment. The article explains the different types of equipment available, the special areas designated under the regulation and the requirements for discharge of sewage into the sea. Similarly, seafarers are generally aware of the requirements for the disposal of garbage overboard, but are less familiar with the requirements for the discharge of cargo residues and hold wash-water. We aim to clarify these requirements and give guidance to crew to ensure compliance.

In a recent edition of *Standard Safety* we looked at the importance of cardiovascular health, as heart disease is the greatest cause of illness amongst seafarers. In this edition, we look at the risk of diabetes, which has become an increasing threat for seafarers, and what they can do to reduce this risk.

We hope you will enjoy reading this issue of *Standard Safety* and welcome any comments you may have.

Improving hazard awareness

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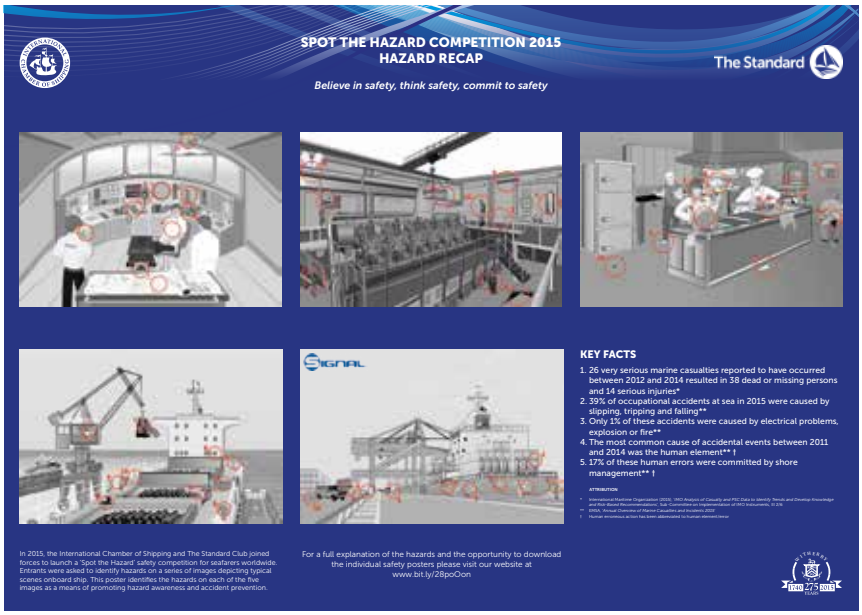
The Standard Club and the International Chamber of Shipping have jointly produced safety posters for distribution worldwide.

In the *Standard Bulletin* of April 2016 we discussed the results of the successful 'Spot the Hazard' competition created jointly by The Standard Club and the International Chamber of Shipping. The competition was open to all serving seafarers and required them to identify a series of hazards embedded in illustrated depictions of day-to-day scenes on board ship.

The aim of the competition was to promote hazard awareness by providing real world examples of the kinds of scenarios that feature most commonly in seafarer personal injury claims. Participating seafarers were invited to circle ten hazards in up to five safety posters (covering deck, engine, galley, terminal and bridge scenarios). Entrants were also required to submit an original safety idea designed to improve safety on board ships.

We published the five individual posters with the hazards marked and a full description on our website for easy reference.



Five seafarers were selected as winners, one for each category, and each received a US$2,000 cash prize and a certificate. The winners, pictured overleaf receiving their certificates from club and chamber representatives, were those deemed to have correctly identified the most number of hazards and to have provided the best original safety idea in their category, most likely to improve safety on board a ship. The three-person judging panel consisted of representatives from each participating organisation: Jeremy Grose from The Standard Club, Peter Hinchliffe from the International Chamber of Shipping and Andrew Collins from Witherby Publishing Group, who provided the design resources to create the posters and other competition materials.

The competition will be rounded off by the distribution of a safety poster. The five individual category posters have now been combined into a single large poster, with hazards circled, which will be distributed to club members. It is hoped that the presence of this poster on board members' ships will serve as a long-term reminder to seafarers of the dangers inherent in their daily lives and the need to risk-assess every activity to avoid needless tragic accidents.

Members should receive copies of this poster over the coming weeks. Any additional requests can be logged by informing your usual club contact or the author.

A warm thank you to all judges for their time and contribution.

JUDGING PANEL (in order, left to right)
1. Andrew Collins, Witherby Publishing Group
2. Jeremy Grose, The Standard Club
3. Peter Hinchliffe, International Chamber of Shipping

Improving hazard awareness continued

Safety on Deck

1. Hormazdiar Dhondy receiving from Mr Sunil D'Souza, James Mackintosh & Co. Pvt. Ltd., Standard Club correspondent

Safety in the Terminal

2. Gointharajan Muthu Athappan receiving from Capt. Rene J. Hansen, Master M/V Elly Maersk

Safety in the Engine Room

3. Lilesh Patil receiving from Capt. Yves Vandenborn, Director of Loss Prevention, The Standard Club

Safety on the Bridge

4. Aleksis Tenis receiving from Capt. Batmanov and Capt. Eugene Drevitski, PANDI Balt Ltd, Standard Club correspondent

Safety in the Galley

5. Bjorn Richter receiving from Mr Martin Olofsson, P&I Scandinavia, Standard Club correspondent

Near-miss reporting and why it matters

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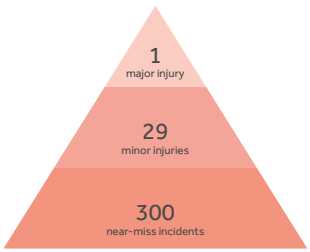
The loss prevention department is currently supporting a number of initiatives to encourage near-miss reporting as a means of improving safety on board ships. In this article, we explain these projects and why near-miss reporting is essential.

Why near-miss reports matter

In 1931, Herbert William Heinrich, an industrial safety expert from America, published his book *Industrial Accident Prevention, A Scientific Approach*, which stated that for every major injury suffered by an organisation, there were an additional 29 accidents resulting in minor injuries and a further 300 accidents causing no injuries. We call these 300 accidents near-misses. When depicted graphically, these figures show an easily understandable relationship between the single serious accident and the more numerous near-misses, which form the base of the 'triangle'.



Since the publication of his work, many researchers have questioned the exact numbers that form the ratios in Heinrich's triangle, but there is widespread support for the idea that accidents resulting in harm are outnumbered by near-misses in the vast majority of organisations. Near-misses are valuable because they provide a large body of data to discover trends. They reflect the risks associated with the activities being undertaken by the organisation and allow it to understand these risks before serious injury occurs.

The experience of the club

These trends and the learnings they generate are only possible if the company in question collects and analyses near-miss reports effectively. We advise:

- a systematic approach by management to collecting and analysing near-miss reports
- reinforcement amongst seafarers of the importance of submitting reports
- education of seafarers to mitigate concerns associated with submitting reports internally. Such concerns include fear of losing their job or of admitting their error.

During our experience of engaging with members and assessing their safety systems, we have found that often the benefits of near-miss reporting are lost due to misfires in safety reporting systems. For instance, many companies do not properly collect, collate and analyse the reports. Because they fail to take a systematic approach, they are prevented from acting upon this information.

However, the main barrier to benefitting from near-misses is the fact that personnel on board are reluctant to report their near-miss incidents.

Near-miss reporting and why it matters continued

The benefits of near-miss reporting are reduced incident rates for the organisation as a whole and a reduced risk of seafarers being involved in a life-altering accident.

There are many reasons for this, such as: cultural beliefs, fear of the company's culture or fear of losing their employment.

The third point is a particular barrier to near-miss reporting. The (maritime) Confidential Hazardous Incident Reporting Program (CHIRP) encourages seafarers to confidentially submit reports regarding near-misses on board their own ship or with another ship. This should not replace internal reporting but should supplement it.

CHIRP

CHIRP was created to provide an outlet for mariners and maritime organisations to report hazardous incidents which would otherwise have gone unreported. Information about a hazardous incident is received and validated, and the lessons learned are disseminated to the wider maritime industry. When appropriate, report information is also discussed with specific maritime agencies. CHIRP maintains the confidentiality of all the reports it receives. It enables any member of a maritime organisation, regardless of rank or nationality, to report what they deem to be a hazardous event and make a contribution to the overall safety of the industry.

Those mariners who witness a hazardous event are free to report the incident without fear of repercussion, making it far more likely that such reporting will occur. Indeed, organisations that are serious about reaping the rewards of near-miss reporting should give serious consideration to emulating the approach of CHIRP, including systematic categorisation, analysis and anonymity for those reporting.

CHIRP's latest initiative, sponsored by The Standard Club, is the production of new 'video maritime feedback bulletins', which are released on a quarterly basis. Each ten-minute production promotes good safety practices and provides opportunities for shipowners and operators to compare their organisation's own performance in such matters.

The club advocates near-miss reporting

In addition to the club's sponsorship of CHIRP, it is also working with another valued partner, Videotel, to produce a film about the value of near-miss reporting for the maritime industry, called *Report a Near-miss – Save a Life*. The aim of this production is to educate mariners and shore managers specifically about near-miss reporting, including:

- what a near-miss is
- the value of near-miss reporting
- what, when and how to report a near-miss incident
- the value of a proper safety culture on board and from the top down.

The video also provides shore managers with information regarding their own crucial role in a near-miss system. This includes their incumbent responsibility to acknowledge and reply to every near-miss report and to be reflective of their own practices when considering causation. The Standard Club's involvement in such projects is part of its commitment to reduce the toll of preventable accidents, not just amongst its own membership but within the wider maritime industry.

Summary

Near-miss reporting is a vital component of any organisation's just culture. The proper analysis of near-miss reports and trends allows the organisation to predict with some accuracy what form the next major accident may take and thus take steps to prevent it.

Breaking the error chain, part 3

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In the previous two editions of *Standard Safety* we used case studies to demonstrate how taking shortcuts for the convenience of completing a task quickly leads to increased risk for seafarers.

In this last instalment, we will look at two new examples where shortcuts caused a cargo overflow and a total loss.

Pollution case study – cargo lost overboard

The excellent safety standards applied throughout the tanker industry speak volumes for the attention paid to pollution prevention. Modern features of chemical tankers, such as dedicated lines, deepwell pumps, high-velocity venting and dedicated discharge manifolds, considerably reduce the risk of accidental discharge. However, the human element can negate these safety features.

The ship in this case study had 12 cargo tanks and 12 deepwell pumps, but only eight cargo manifolds. There were two common lines which also connected to the MARPOL overboard discharge line.

A removal spool piece and a blind flange were fitted between the common line and the overboard discharge line. When the common line was in use, either method could be used to isolate the overboard discharge line. However, the crew usually fitted a blind flange, leaving the spool piece in place. When a discharge was required through the overboard discharge line, the blind flange was removed. There was also an isolation valve at the discharge line.

On this occasion, the isolation valve had not been properly closed, the spool piece was in place and the blind flange was not fitted. During cargo discharge through the common line, cargo entered the overboard discharge line and spilled into the sea. The principal cause was failure to fit the blind flange.

Errors made

- Failure to insert the blind flange in the cross connection between the overboard discharge line and the common cargo line.
- Failure to check that the appropriate cargo valves were fully closed before starting cargo discharge.
- Failure to keep a proper deck watch.

Breaking the chain

There were a number of individuals who had responsibility for making sure the overboard discharge line was correctly blanked off, including the master, the chief officer, the duty deck officer, the pumpman and the duty deck rating, any of whom could have intervened and fitted the blind flange, thereby preventing the incident.

Total loss case study

Total loss without collision or grounding is a rare event, but it can occur in bad weather on a ship which has 'negative stability'.

The ship had arrived at an Indonesian river anchorage to load logs. The logs were floated down river before being marshalled and hauled on board. The master was experienced, but new to this cargo. The loading commenced below deck until the

Breaking the error chain, part 3
continued

ship's lower holds were full, at which point stowage began on deck. It was remarked that when the ship reached maximum capacity, there appeared to be many more logs on deck than during the previous voyage. Figures indicated that almost as many logs were stowed on deck as below deck.

The ship sailed and the departure stability calculation indicated positive stability.

The ship was west of Japan on a voyage to South Korea when it was overwhelmed by an especially severe storm. The ship rolled and pitched heavily. A survivor, who was on bridge watch, said: 'The ship was hit by a really big wave. It rolled onto its beam, stalled and sank.'

She sank in deep water, with the loss of four seamen. The ship and records were lost, but the seamen's statement indicates negative stability. This may have been caused by the consumption of the fuel in the double-bottom tanks causing the ship's centre of gravity to rise. The effect of free surface in the slack double-bottom tanks would have further reduced stability.

Errors made
- Too many logs had been loaded on deck.
- An estimated arrival stability condition had not been calculated.
- Failure to calculate stability on completion of loading below deck.
- Failure to seek a port of refuge when the weather report indicated a severe storm west of Japan.

Breaking the chain
A concern about short loading resulted in overloading. The master or chief officer should have refused to load the additional logs on deck.

Summary
Both incidents would have been prevented if someone had acted differently. There is nothing new or startling about their cause or their potential prevention. Human errors and shortcuts can lead to a chain of events resulting in an incident or near-miss.

Key lessons
- Company procedures and instructions exist for a reason and should be adhered to.
- Permit-to-work systems and risk assessments should not be neglected or ignored.
- Bridge teams should work as a team, keeping a proper lookout and assessing every situation.

NPK fertiliser and self-sustaining decomposition

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In this article, we will discuss NPK fertiliser, why it is potentially hazardous, what precautions to take and what to do should the worst happen.

Whilst much is known about the hazards associated with the carriage of grain or coal cargoes, the hazards associated with NPK fertilisers are less well known.

Introduction

During the 20th century, the growth in the world's population prompted demands for more effective compound fertilisers which would increase crop yields and feed more people. The fertiliser industry responded to these calls by creating a group of compound fertilisers which became known as NPK fertilisers. Around the world, nearly 100m tonnes of fertiliser are used in the agricultural process every year, and a significant proportion of this fertiliser falls under the category of NPK fertiliser.

The name NPK derives from the individual chemical symbols for the plant nutrients in the fertiliser: N-nitrogen, P-phosphate and K-potash (potash is derived from potassium, which has the chemical symbol K). The percentage amounts of these nutrients are expressed using a three-figure notation, which is either printed on the fertiliser containers or given in the documentation. '15-15-15' for example would indicate that the NPK fertiliser in question consists of 15% nitrogen, 15% phosphate and 15% potash.

This article is specific to compound fertilisers where the nitrogen (N) is provided by ammonium nitrate, because this poses specific, unique risks to ships during carriage, requiring specialist knowledge.

Self-sustaining decomposition

All NPK fertilisers based on ammonium nitrate will decompose when heated, emitting toxic gases and heat. Removal of the heat source will stop the decomposition in many cases. However, there is a class of fertiliser which will continue to decompose even after the heat source is removed. The decomposition occurs locally in the initial stages, but gradually spreads throughout the mass of the cargo. This is called self-sustaining decomposition (SSD).

The emissions

Gases

SSD will cause the emission of large amounts of hot gas. The most dangerous gases emitted are nitrogen dioxide, nitrosyl chloride, hydrochloric and hydrofluoric acids. Whilst concentrations will vary, in all cases where SSD has occurred, personnel should be protected by personal protective equipment and self-contained breathing apparatus if being exposed to the emitted gases.

Heat

The reaction which occurs during SSD may result in temperatures as high as 500°C. During a case of SSD on the Dutch-registered cargo ship *Ostedijk*, the upper portions of the fertiliser cargo reached 175°C indicating that the inside of the cargo was at significantly higher temperatures.

For SSD to occur, a number of conditions must be met, including:

- a particular range of NPK composition
- a suitable catalyst such as chloride
- a heat source.

Such high levels of heat have been known to cause damage to ships' structures and adjoining machinery spaces, and cause the spread of SSD to other holds.

IMSBC code – fertiliser classification

Fertilisers that are capable of SSD fall under 'ammonium nitrate based fertilizer UN 2071'. Other fertiliser types such as UN 2067 and 'ammonium nitrate based fertilizer (non-hazardous)' will also suffer decomposition, but the decomposition that will occur will not be self-sustaining and should remain localised within the cargo.

The decision to classify a fertiliser product as 'ammonium nitrate based fertilizer (non-hazardous)' depends on the results of a specified trough test. The trough test involves the application of heat to a representative sample of fertiliser to induce decomposition and to allow the extent of propagation to be measured. A fertiliser is classified as free from the risk of SSD and non-hazardous if the propagation does not continue throughout the fertiliser sample in the trough after the heat source has been removed.

An indication of the likelihood of SSD taking place can be predicted by an expert when given the full composition of the fertiliser, but this is no substitute for a trough test as predictions are complicated by variations in composition.

It should be noted, however, that concerns have been raised about the effectiveness of the trough test in determining the susceptibility of a fertiliser to SSD. It is believed that the cargo on the *Ostedijk* had been subjected to a trough test and had been declared free from the hazard of SSD, only to suffer a major occurrence of SSD later in the voyage.

Precautions and emergency actions

The most effective means of avoiding SSD is to ensure that the cargo does not come into contact with a source of heat which will initiate the reaction. Prior to loading, consideration should be given to eliminating these heat sources, which include hold lighting, bunker tank heating systems and adjoining machinery spaces. Hot work must not be scheduled to take place post loading at locations where it may initiate decomposition in the cargo. Where holds contain lights or other electrical fittings, these fittings/lights should be switched off and electrically isolated. Smoking on the upper decks must be banned.

In the event of SSD:

1. Identify and, where possible, eliminate the source of heat that initiated the decomposition.

2. Contact your P&I club and/or a suitable fertiliser expert for advice. Local shore-based authorities could also be contacted for practical assistance should this be deemed necessary.

3. Manoeuvre the ship to adjust the relative wind in order to prevent the gases entering the accommodation.

4. Monitor the heat in the affected hold(s) and, if necessary, set up boundary cooling to prevent damage to the ship's structure or the spread of the SSD to adjacent holds.

5. Personnel should wear self-contained breathing apparatus and suitable protective clothing, including boots, gloves, coveralls and headgear if conducting any activities that may bring them into contact with the decomposition gases.

NPK fertiliser and self-sustaining decomposition continued

It should be noted that because the reaction is a chemical-based decomposition and not combustion, further oxygen is not required to sustain the reaction. Fixed firefighting installations which discharge CO_2 or other agents designed to smother fires will not affect the decomposition process.

6. Ventilate toxic gases. It may seem counter-intuitive to ventilate a self-heating cargo, but the reaction producing the gases is the result of a chemical-based decomposition and not combustion (as in the case of coal for instance). Ventilation can be accomplished by opening the cargo hatches. However, consideration should be given to the proximity to land as the toxic gases would also affect nearby population centres in the event of a lee shore.

7. Copious amounts of water will be required to arrest the reaction. This water should be directed into the site of the decomposition. Fog lances (or victor lances) are a particularly effective tool because they can be used to break through the crust of decomposed fertiliser and better target the site of the reaction. Due consideration should be given to the ship's stability where large quantities of water are used.

Post SSD incident management

When managing the aftermath of an incidence of SSD, there are a number of considerations which need to be taken into account:

1. Water-damaged fertiliser can set like concrete; therefore, cargo that has been exposed to water should be discharged as soon as is practicable.

2. The by-products of decomposition can condense onto the ship's structure. These are extremely corrosive and should be dealt with as soon as it is safe to do so.

3. Incidents of SSD and exposure to water will result in the loss of cargo value, which may result in a claim.

We would like to thank David Thomson, Independent Fertiliser expert, for his valuable contribution to this article.

MARPOL Annex IV – Regulations for the Prevention of Pollution by Sewage from Ships

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Sewage, which is a water-carried waste, contains a significant proportion of potentially disease-causing microbes known as pathogens. If sewage is released into the sea, it can cause a threat to the environment and serious health hazards. It is therefore necessary that its discharge is regulated.

This article aims to provide information on why releasing untreated sewage into the sea is hazardous and guidance on the regulations that control pollution of the sea by sewage.

Hazards of releasing untreated sewage in the sea

Ships produce waste water in two categories:

- Grey waste water is generated by domestic activities such as using sinks and showers, or doing laundry and dishwashing.
- Black waste water contains drainage and other wastes from any form of toilets or urinals and from spaces containing living animals. It also includes medical discharges generated by a ship's hospital, dispensary, etc.

The amount of waste water reaching the sea is of particular concern as it affects the marine environment.

Black waste water in particular is naturally rich in both phosphorous and nitrogen, which encourages the excessive growth of plants and algae, creating toxic algae 'blooms'. These algae cause oxygen depletion when they decompose. The higher the discharged concentration, the more this reaction takes place and the lower the amount of oxygen available for fish and other aquatic animals and plants, killing larger marine life.

Waste water also introduces pathogenic bacteria and viruses, and if discharged into coastal waters, it poses a risk to public health for swimmers and those eating contaminated seafood.

Sewage regulations

The principal international instrument regulating discharges of waste water from vessels is Annex IV of MARPOL.

Ships of 400gt and above engaged in international voyages, or which are certified to carry more than 15 persons, are required to be fitted with either:

- an approved sewage treatment plant
- an approved sewage comminuting and disinfecting system
- a sewage holding tank to control the discharge of sewage into the sea.

The discharge of sewage or black water into the sea is prohibited, except in the following cases:

- Untreated sewage may only be discharged at a distance of more than 12nm from the nearest land, provided that sewage held in holding tanks is not discharged instantaneously, but at a moderate rate when the ship is en route and proceeding at a speed of not less than 4 knots. MEPC resolution 157(55) provides recommendations for the rate of discharge to be used.
- Comminuted and disinfected sewage may be discharged at a distance of more than 3nm from the nearest land, so long as an approved system is used.

MARPOL Annex IV – Regulations for the Prevention of Pollution by Sewage from Ships continued

- Effluent from an IMO-approved sewage treatment plant may be discharged at any location providing the effluent does not produce visible floating solids or cause discolouration of the surrounding water. MEPC resolution 227(64) provides guidelines on the implementation of effluent standards and performance tests for sewage treatment plants.

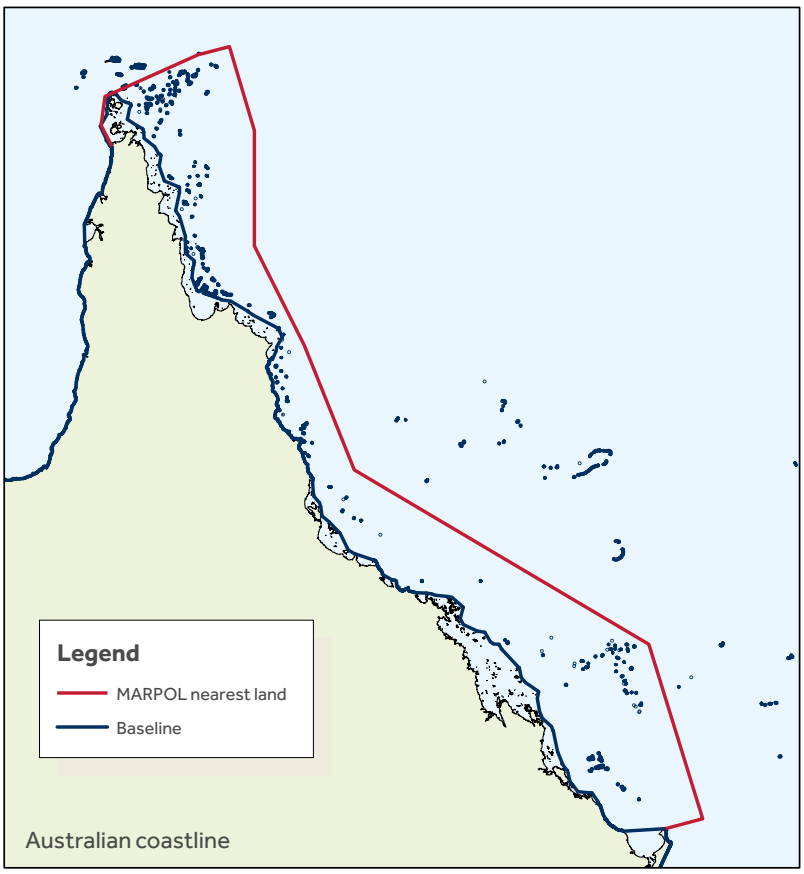
Nearest land

The term 'nearest land' means the baseline from which the territorial sea of the territory in question is established. In Australia, this extends up to the outer edge of the Great Barrier Reef, and no discharge of any type is permitted in the area of the Great Barrier Reef.

Special area

In July 2011, the IMO (through MEPC resolution 200(62)) designated the Baltic Sea as a 'special area' for sewage from passenger ships. The decision entered into force on 1 January 2013 and this is the only designated area as specified under MARPOL Annex IV. In the special area, the discharge of sewage from passenger ships is prohibited unless the ship has in operation an approved sewage treatment plant that meets the applicable additional effluent standards as specified under MEPC resolution 227(64).

As agreed during the 69th session of MEPC in April 2016, stricter discharge restrictions will apply from 1 June 2019 for new passenger ships (built on



or after 1 January 2016). For existing passenger ships, the date is set as 1 June 2021. Single voyages of passenger ships into and out of Russian territorial waters east of the 28°10′ longitude which do not call at any other ports in the Baltic Sea will get a further two-year grace period until 1 June 2023.

Alternatively, sewage from passenger ships may be discharged to reception facilities in ports. The status as a special area has now also become fully effective after all states bordering the Baltic Sea have reported to the IMO that sufficient reception facilities for sewage from passenger ships are available in their ports.

This requirement does not apply to cargo ships.

Local regulations

In addition to international standards established under MARPOL Annex IV, some jurisdictions also regulate sewage discharges. For example, in the United States, a variety of vessel discharges (including sewage and grey water) are regulated through the EPA's Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) program. Under this act, specific areas are designated as 'no-discharge zones' (NDZs). Sewage discharges are prohibited in these areas.

Sewage treatment plants on ships

International maritime laws require black waste water to be treated before discharge overboard. Treatment of waste water can be carried out separately for grey and black waste water, or both streams can be processed by a shared system.

In recent years, there has been an increased focus on the condition and operation of sewage treatment plants or sewage comminuting and disinfecting systems by the Port State Control officers. A number of ships have been detained because of improper operation and maintenance of sewage treatment systems.

The most common errors are the inadequate usage or non-functioning of sewage treatment plants, and unauthorised modifications of sewage treatment systems. As mentioned earlier, ships are only allowed to discharge sewage in ports if they use an IMO-approved sewage treatment plant. Comminuted and disinfected sewage using an approved system must be discharged at a distance of more than 3nm from the nearest land.

There have been cases where the authorities have levied fines on ships for discharging untreated sewage in port because the sewage treatment plant was bypassed or the overboard discharge valve had seized up or was kept in 'open to sea' position. Any malfunction of the equipment or non-compliance with the approved drawings may result in an invalid International Sewage Pollution Prevention Certificate and, as such, is a violation of MARPOL Annex IV.

It is therefore essential that ships' crews are aware of the MARPOL Annex IV requirements and familiar with the proper operation of the shipboard sewage treatment system. It is also important that regular maintenance of the system is carried out, and modifications (if any) should only be undertaken following approval from the class on behalf of the administration (the ship's flag state).

Members are reminded that, other than in cases of purely accidental discharge, P&I cover for fines related to MARPOL violations is only available on a discretionary basis. We recommend members to proactively report any equipment malfunction to the vessel's flag state and/or class, and all reasonable actions must be taken to prevent discharge of untreated sewage overboard.

Disposal of solid bulk cargo residues and cargo hold wash water under MARPOL Annex V

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MARPOL Annex V deals with the regulations for the prevention of pollution by garbage from ships. The disposal of non-recoverable cargo residues and hold wash water is also governed under this annex. Although most members are well versed with the requirements for the various garbage categories covered in MARPOL Annex V, there is some ambiguity regarding the disposal of cargo residues and hold wash water. This article aims to clarify the requirements and highlights the practical steps to be taken by the crew in order to ensure compliance.

In Standard Bulletin, April 2014, the club provided guidance on the disposal of cargo residues in line with the revised MARPOL Annex V guidelines. We also highlighted the challenges caused by inadequate port reception facilities for discharging hold wash water containing cargo classified as harmful to the marine environment (HME).

In April 2016, IMO's MEPC decided that cargo residues or cargo hold wash water containing substances classified as HME are prohibited from being discharged overboard.

Regulatory background

The revised MARPOL Annex V (resolution MEPC.201 (62)), which entered into force on 1 January 2013, generally prohibits the discharge of all garbage into the sea, unless explicitly permitted under regulations 4, 5 and 6 of the annex. The only exceptions are food waste, animal carcasses and cargo residues (and cleaning agents) in wash water which are not harmful to marine environment.

IMO's MEPC, during its 63rd session, adopted the 2012 guidelines for the implementation of MARPOL Annex V (resolution MEPC.219(63)) and the 2012 guidelines for the development of garbage management plans (resolution MEPC.220(63)).

At the 64th session of MEPC (in October 2012), the IMO recognised that the toxicity data which is needed to classify a solid bulk cargo as harmful to the marine environment (HME) may not be readily available and established a timeframe (from 1 January 2013 to 31 December 2014) for provisional classification of solid bulk cargoes. From 1 January 2015, the shipper should provide a complete classification for the cargo to be shipped. As further stipulated by MEPC.1/Circ.791 the shipper must also declare whether the cargo is classified as HME to the port state authorities at the port of loading and unloading.

During the 65th session of MEPC (in May 2013), the overall situation was reviewed again and, due to lack of adequate reception facilities, it was agreed that until 31 December 2015, wash water from cargo holds previously containing solid bulk cargoes classified as HME may be discharged outside special areas, under certain conditions as described in MEPC.1/Circ.810.

The proposal to extend the application of MEPC.1/Circ.810 was not approved during the MEPC 69th session (in April 2016). As a result, discharge of HME cargo residues and cargo hold wash water outside of the special areas (MARPOL Annex V) is now prohibited.

Definitions

'Cargo residues' are defined under MARPOL Annex V as the remnants of any cargo that is not covered by other annexes and that remains on deck or in holds following loading or unloading. These include loading and unloading excess or spillage, whether in wet or dry condition, or entrained in wash water, but do not include cargo dust remaining on deck after sweeping or dust on the external surfaces of the ship.

When packaged cargoes (including tank containers) are damaged, the consequential spillage of cargo will no longer fall within the definition of packaged cargo and should be treated as residues or wastes, and therefore will be covered by MARPOL Annex V.

Effectively, Annex V applies to all solid bulk cargo residues (as oil, noxious liquid and dangerous cargo carried in packaged form are covered by Annexes I, II and III respectively). However, the 64th session of MEPC agreed that when packaged cargoes (including tank containers) are damaged, the consequential spillage of cargo will no longer fall within the definition of packaged cargo and should be treated as residues or wastes, and therefore will also be covered by MARPOL Annex V. Such spillages will need to be treated in accordance with the guidance provided under the IMDG code supplement. Spillages from substances classified as marine pollutants will need to be contained/ collected on board for shore disposal.

The cargo hold wash water is basically the waste water consisting of the non-recoverable cargo residues and hold cleaning chemical agents or additives.

Cargo material contained in cargo hold bilge water is not considered to be cargo residue if it is not harmful to the marine environment and the bilge water is discharged from a loaded hold through the ship's fixed piping bilge drainage system. Vessels at anchor for a period of time with empty cargo holds may discharge hold bilge water that is not directly related to any hold cleaning activities.

HME substances

The term 'harmful to the marine environment' (HME) is not defined under MARPOL Annex V, but under the 2012 guidelines for the implementation of MARPOL Annex V (resolution MEPC.219 (63)).

Cargo is considered as HME if it fails any one of the seven criteria stipulated under the UN Globally Harmonized System of Classification and Labelling of Chemicals (UN GHS):

- Acute toxicity
- Chronic toxicity
- Carcinogenicity
- Mutagenicity
- Reproductive toxicity
- Repeated exposure of specific target organ toxicity (STOT)
- Presence of plastics, rubber or synthetic polymers

There are three main stages in the classification of a cargo using the seven UN GHS criteria:

- A literature search of available information.
- Laboratory testing for toxicity, biodegradation and bioaccumulation.
- The comparison of the biodegradation and bioaccumulation data with published carcinogenicity, mutagenicity and reproductive toxicity (collectively known as CMR) as well as STOT studies.

Shippers are required to use these seven criteria to determine whether the cargo is harmful to the marine environment. A declaration as to whether the cargo is HME is required to be made by the shippers in accordance with section 4.2 of the International Maritime Solid Bulk Cargoes (IMSBC) code.

The table overleaf summarises the classification criteria.

Disposal of solid bulk cargo residues and cargo hold wash water under MARPOL Annex V continued

A summary of the classification criteria[1]

No	Criteria		Category			
1	Acute aquatic toxicity		**Category 1** 96hr LC_{50} (fish), 48hr EC_{50} (crustacean) or 72/96hr ErC_{50} (algae) is ≤ 1.00mg/l	**Category 2** 96hr LC_{50} (fish), 48hr EC_{50} (crustacean) or 72/96hr ErC_{50} (algae) is > 1.00 but ≤ 10.0mg/l	**Category 3** 96hr LC_{50} (fish), 48hr EC_{50} (crustacean) or 72/96hr ErC_{50} (algae) is ≥ 10.0 but < 100mg/l	
2	Long-term (chronic) aquatic toxicity	Adequate chronic data	**Category 1** Not rapidly degradeable = chronic NOEC or ECx (fish), (crustacean) or (algae) is ≤ 0.1mg/l Rapidly degradeable = chronic NOEC or ECx (fish), (crustacean) or (algae) is ≤ 0.01mg/l	**Category 2** Not rapidly degradeable = chronic NOEC or ECx (fish), (crustacean) or (algae) is ≤ 1.0mg/l Rapidly degradeable = chronic NOEC or ECx (fish), (crustacean) or (algae) is ≤ 0.1mg/l	**Category 3** Rapidly degradeable = chronic NOEC or ECx (fish), (crustacean) or (algae) is ≤ 1.0mg/l	
		Inadequate chronic data	**Category 1** Acute aquatic toxicity category 1	**Category 2** Acute aquatic toxicity category 2	**Category 3** Acute aquatic toxicity category 3	**Category 4** Poorly soluble substances for which no acute toxicity is recorded
3	Carcinogenicity		**Category 1A** Known human carcinogen based largely on human evidence	**Category 1B** Presumed human carcinogen based on demonstrated animal carcinogenicity	**Category 2** Suspected carcinogen. Limited evidence of human or animal carcinogenicity	
4	Mutagenicity		**Category 1A** Known mutagens. Possible evidence from human epidemiological studies of mutagenicity	**Subcategory 1B** Positive results in: *In vivo* heritable germ cell tests in mammals or this combined with some evidence of germ cell mutagenicity or mutagenic effects in human germ cell tests without demonstration of progeny	**Category 2** Suspected or possible mutagen. Positive evidence from tests in mammals and/or in some cases from *in-vitro* experiments	
5	Reproductive toxicity		**Category 1A** Known human reproductive toxicant based on human evidence	**Category 1B** Presumed human reproductive toxicant largely based on data obtained from animal studies	**Category 2** Suspected human reproductive toxicant. Human or animal evidence possible with other information	
6	Repeated exposure STOT		**Category 1** Substances that have produced significant toxicity in humans or that, on the basis of evidence from animal studies, have the potential to do so following repeat exposure	**Category 2** Substances that are presumed to be harmful to human health at repeated exposure (animal studies with significant toxic effects relevant to humans at generally moderate exposure or human evidence in exceptional cases)		
7	Plastics		Cargo consists of, or contains: synthetic polymers, rubber, plastics or plastic feedstock pellets			

Not rapidly degradeable[2] with high bioaccumulation[3] PLUS...

Category in blue = Criteria not met

LC_{50} = The lethal concentration of the compound that kills 50% of test organisms in a given time
ErC_{50} = The EC50 in terms of reduction of growth rate
EC_{50} = Half max effective concentration
NOEC = No observed effect concentration
ECx = The concentration associated with x% response

1 Further detail can be reviewed in part 3 and 4 of the UN GHS 2011.
2 Essentially substances are considered rapidly biodegradable in the environment if >70% (based on dissolved organic carbon) or >60% (CO_2 generation or O_2 depletion) of the material is degraded within a 28 day period. If no other data is available then BOD_5/COD_5 >0.5.
3 Bioaccumulation is measured through exposure studies in fish or shellfish and reported as a bioconcentration factor (BCF) where high = >500 or an octanol/water partition coefficient (log K_{OW}) where high = >4.

Discharge requirements of cargo residues and cargo hold wash water

The guidelines stipulated under MARPOL Annex V state that discharge of cargo residue should be minimised and every effort should be made to ensure that as much of the cargo as possible is unloaded at port.

The ship's garbage management plan should include measures to reduce the amount of garbage generated. This includes measures to mitigate the cargo spillage and ensuring that upon completion of discharge, the cargo holds, decks and hatch covers are thoroughly cleaned and swept down, with any residual cargo being discharged to shore, as far as practicable.

The disposal requirements for cargo residues and hold wash water from ships are:

- No discharge of any cargo residues or cleaning agents specified as HME is permitted in cargo hold, deck and external surfaces wash water.
- Cargo residues not specified as HME may be discharged more than 12nm from land.
- Cleaning agents in cargo hold, deck and external surfaces wash water may be discharged to the sea provided they are not HME.
- Discharge of cargo residues is prohibited within the defined 'special areas' established under Annex V (the North Sea, Baltic Sea, Mediterranean Sea, Black Sea, Red Sea, Persian Gulf, Antarctic and the wider Caribbean Region). For cargo hold wash water containing residues, discharge may be permitted, provided the ship is transiting between ports, both of which are within the special area, and where no adequate reception facilities exist.

Disposal of solid bulk cargo residues and cargo hold wash water under MARPOL Annex V continued

A simplified overview of the regulations regarding the discharge of cargo residues and cargo hold wash water under MARPOL Annex V can be accessed on the IMO website.

Practical considerations

The shipper has an obligation to declare if the cargo is HME in accordance with section 4.2 of the IMSBC Code. If the cargo is classified as HME, then the cargo residues and cargo hold wash water need to be stored on board and discharged to a reception facility at the loading port.

In such a case, apart from the additional costs involved in discharging hold wash water ashore, there will be a safety consideration that needs to be assessed, as the storage of hold wash water in cargo holds may affect the ship's stability due to the free surface effect. In addition, the ship's holds will not be ready to load the next cargo, resulting in delays. Members are recommended to plan ahead and ensure that commercial agreements are made regarding the logistical arrangements and any additional costs/delays arising out of such practical aspects.

If the hold wash water becomes mixed with the ballast water system, it may lead to non-compliance with the ballast water management discharge criteria. Further, transferring and storage of cargo hold wash water in ballast tanks may lead to damage to the pumps, piping systems and coatings. It is recommended to seek flag state and class guidance prior agreeing to carry hold wash water in the ballast tanks.

Lastly, it is imperative that the crew are familiar with the garbage disposal requirements and have a clear understanding of the MARPOL discharge requirements. Masters are encouraged to report to IMO on any alleged inadequacies of port reception facilities, in accordance with the procedures set out in MEPC.1/Circ.834.

Members are reminded that P&I cover for fines involving a MARPOL violation, except for accidental discharges, is discretionary. In such cases, members will be required to satisfy the board that all reasonable steps had been taken to avoid the event giving rise to the fine.

Seafarers: choose a long and successful career, not the risk of diabetes

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This article has been contributed by our enhanced PEME provider MRI, experts in the care, monitoring and repatriation of sick and injured seafarers.

Surely diabetes is a disease of the rich, first world countries and not one to worry seafarers from other parts of the world? Wrong! This article explains how and why all seafarers should be alert to the risk of diabetes.

Introduction

If diabetes is left untreated for many years, it can lead to a significant decline in the health and effectiveness of a seafarer, which can result in a claim for your P&I club. The mistaken belief amongst seafarers that diabetes will automatically lead to the end of their maritime careers makes many avoid seeking treatment and hide their condition until it is too late. In fact, seafarers who are identified as suffering from type 2 diabetes will not automatically lose the chance of employment at sea. Whilst type 1 diabetes is an automatic failure, treatment options exist for sufferers of type 2 diabetes, provided that there are no significant associated conditions such as hypertension. Seafarers with type 2 diabetes who are free from such conditions are considered 'fit but at risk' and are monitored more regularly than a seafarer considered 'fit'.

Despite this though, seafarers should be under no illusions, the price of untreated type 2 diabetes is an increased risk of heart disease, renal problems, blindness and nerve damage. Such complications are often the actual cause of a seafarer's medical repatriation, with the diagnosis of diabetes coming after the fact. It should be noted that diabetes is an easily detectable condition when a Pre Employment Medical Examination (PEME) is conducted by a competent clinic.

The aim of this article is to educate seafarers so that they can make positive choices about their own lifestyle. Ignorance or dishonesty is not an effective strategy, it's time for seafarers to be realistic about their health and take charge before it is too late.

Diabetes in seafarers

MRI has been monitoring seafarer health over several decades. Trends have emerged showing that diabetes is beginning to affect all nationalities as diets change and living standards improve in countries previously viewed as having low or middle incomes. By 2035, a recent study predicts, there may be nearly 600 million people suffering from this chronic disease worldwide.

What is it?

There are two types of diabetes, type 1 and type 2.

Type 1 diabetes can develop at any age, but usually appears before the age of 40, and most often in childhood. Around 10% of all diabetes is type 1. With type 1 diabetes, the pancreas (a small gland behind the stomach) doesn't produce any insulin – the hormone that regulates blood glucose levels – so sufferers are required to take insulin injections.

Seafarers: choose a long and successful career, not the risk of diabetes continued

Type 2 diabetes occurs when the body doesn't produce enough insulin to function properly, or the body's cells don't react to insulin. This means that glucose stays in the blood and isn't used as fuel for energy. Type 2 diabetes is often associated with obesity and tends to be diagnosed in older people. We focus on type 2 diabetes in this article as it is the more common risk.

What are the initial symptoms?

The high blood sugar level makes the sufferer:

- feel thirsty
- urinate more than usual, particularly at night
- feel tired all the time.

There is no cure for diabetes, but provided it is diagnosed early on, and then managed and treated, there is no reason why a seafarer should not continue to practise his or her chosen profession. However, undiagnosed or untreated diabetes can lead to a range of serious, debilitating and life-threatening conditions such as heart, kidney and eye disease, strokes, high blood pressure, nerve damage, Alzheimer's and high cholesterol. Foot ulcers and infections are also common.

A regular PEME, including a test for high blood sugar, is an ideal way of screening for this increasingly common disease.

How to manage diabetes

Although there is no cure, after being diagnosed with type 2 diabetes, or if warned about being at risk of developing the condition, the first step is to look at diet and lifestyle, and make any necessary changes to manage it and prevent the risk increasing.

The three major areas that need addressing are:

- diet
- weight
- level of physical activity

Diet

Increasing the amount of fibre in the diet and reducing fat intake, particularly saturated fat, can help prevent type 2 diabetes, as well as manage the condition.

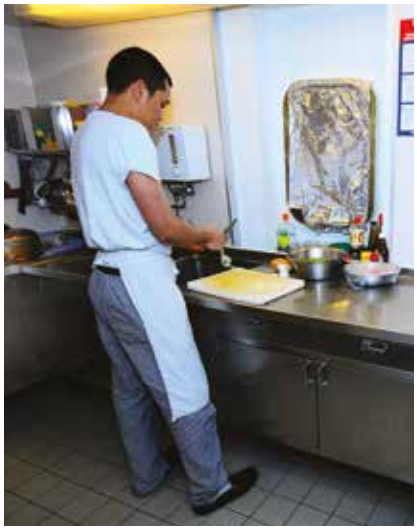
MRI's advice is to:

- Increase consumption of high-fibre foods, such as wholegrain bread and cereals, beans and lentils, and fruit and vegetables.
- Choose foods that are low in fat – replace butter, ghee and coconut oil with low-fat spreads and vegetable oil.
- Choose skimmed and semi-skimmed milk, and low-fat yoghurts.
- Eat fish and lean meat rather than fatty or processed meat, such as sausages and burgers.
- Grill, bake, poach or steam food instead of frying or roasting it.
- Avoid high-fat foods, such as mayonnaise, chips, crisps, pasties, poppadums and samosas.
- Eat fruit, unsalted nuts and low-fat yoghurts as snacks instead of cakes, biscuits, bombay mix or crisps.

Weight

If overweight or obese (body mass index (BMI) of 30 or over), a weight loss programme will be advised, which involves gradually reducing calorie intake and becoming more physically active. The aim is to lose 5–10% of overall body weight over the course of a year, which is a realistic initial target, and then to continue to lose weight until a BMI within the healthy range has been achieved and maintained. This is:

- 18.5–24.9kg/m² for the general population
- 18.5–22.9kg/m² for people of south Asian or South East Asian origin ('south Asian' refers to Bangladesh, Bhutan, India, Indian-Caribbean, Maldives, Nepal, Pakistan and Sri Lanka).



A BMI of 30kg/m² or more (27.5kg/m² or more for people of South Asian or Chinese origin) indicates the need for a structured weight loss programme, which should form part of an intensive lifestyle change programme.

Physical activity
Being physically active is very important in preventing or managing type 2 diabetes.

For adults who are 19–64 years of age, we recommend a minimum of:

- two hours of aerobic activity (raising the heart beat to 131 a minute) a week, which can be taken in sessions of 10 minutes or more
- muscle strengthening exercises that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms) performed on two or more days a week.

It is difficult to maintain an exercise regime at sea, in all weathers, and when in and out of port, but even small increases in physical activity will be beneficial.

Medication
A diagnosed type 2 diabetic may be prescribed medication, normally pills, to control the disease, and even then, as long as no other related conditions have been diagnosed, the seafarer should be able to continue at sea, provided that enough medication for the whole contract is available and is taken regularly, and most importantly, that the lifestyle changes, as described above, are implemented.

Summary

Type 2 diabetes is a condition of choice, not a misfortune. Seafarers must take responsibility for their own health to ensure a long and successful career. Taking responsibility means watching out for symptoms, ensuring proper diet and taking regular exercise. Seafarers should also be aware that it is highly likely that a seafarer with undiagnosed or unacknowledged diabetes will be identified by a PEME examination conducted by The Standard Club's scheme. How this diagnosis will affect the seafarer's career will depend on the individual facts of the case, but advanced, untreated diabetes may well be considered too great a risk for employment at sea. Making the right choices today may make all the difference.

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