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MARS 201101
Metal objects in bulk cargo

I work in a port where coal is discharged from the vessel and transported to the stockyard on a conveyor belt system. Occasionally, the cargo has been found to be contaminated by foreign objects like pieces of metal scrap. (It has also been known for detached fittings from the discharging vessel's holds, like ladder rungs, manhole lids, hold bilge and ballast well rose plates, sacrificial anodes and other components, to have inadvertently entered the discharging grabs along with the cargo: **Editor**).

If these objects reach the conveyor belt, serious damage can result to the entire cargo handling system which could potentially put the terminal out of operation for days or weeks, for which the vessel will be held liable. Before beginning to load dry bulk cargoes, the ship staff must ensure that all hold fittings are in good condition and, if removable, are secured effectively. They must be extra vigilant against foreign materials mixed in the cargo.

During loading, it may not be possible to sight such contaminants, especially if the pour rate is high. Perhaps a written notification or protest letter could be handed to the shipper or terminal stating that the bulk cargo is being accepted on the basis that it is free of hard impurities and holding them liable should such extraneous matter be later found at the discharge port? The local P&I club correspondent and/or an independent surveyor should also be called upon to examine the cargo and to witness the loading and discharge should there be subsequent claims.

MARS 201102
Fatality inside chemical cargo tank

Official report: Condensed from Australian Transport Safety Bureau (ATSB) Marine Occurrence Investigation no. 270

The chief officer on board a chemical tanker died after entering a cargo tank which contained hydrocarbon vapours and was deficient in oxygen. When the ship sailed at night after the cargo had been discharged, the two tanks (5P and 7S) that had carried hexene-1 were still inerted with nitrogen gas. As the tanks were to be loaded at the next port within two days, the crew began day/night tank cleaning operations soon after sailing. The chief mate was a non-watchkeeper, so was able to direct the tank cleaning crew continuously. Early the next morning, during post-cleaning ventilation, the chief mate, who was preparing to conduct pre-loading inspection of the empty tanks, was informed that a 'petrol-like' odour was still coming from 5P tank. He had filled out the enclosed space entry checklists for the tanks he intended to enter that morning, but significantly, no enclosed space entry checklist was filled out for 5P tank.

Later that morning, when the master received an email from the ship's agent requesting pre-arrival information, he was unable to locate the chief mate. Eventually, his lifeless body was located slumped at the bottom of 5P tank. A rescue team donned BA sets and after carrying out tank entry checks, pulled out the officer and moved him to the upper deck. It was noted that the oxygen content of the atmosphere inside the tank varied between 12 per cent and 16 per cent.

Continuous resuscitation efforts were made until the arrival of a helicopter with shore medical personnel, who soon declared that the chief mate was dead. The next day, the vessel arrived at her destination and the chief mate's body was landed.

Root cause/contributory factors

1. Lack of compliance: the chief mate did not follow established industry standards and company specific safety procedures prior to tank entry and the checklists prepared for that day contained many improper entries;

2. The chief mate did not tell anyone that he was entering the tank;

3. An autopsy determined that the chief mate did not fall and that he died as a result of asphyxiation (oxygen deficiency) caused by inhaled hexene-1 vapours.

4. It is possible that, due to complacency or time related pressures, he may have mistakenly entered the wrong tank. In any case, despite his considerable tanker experience, competence and diligence, he inexplicably entered the tank without implementing common safety procedures.

Recommendations/corrective/preventative actions

The managers introduced/implemented the following measures:

1. Enclosed space drills to increase awareness of the dangers associated with enclosed space entry and rescue;

2. A fleet advisory notice circulated regarding the accident;

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3. Formal training for fleet superintendents, focusing on the permit to enter system and the checks they should carry out during their audits;

4. Enhanced warning signage at tank entrances, stating that the tank may be deficient in oxygen;

5. Development of a one-day training session on enclosed space entry for all officers and ratings joining the company's tankers;

6. Revision of SMS procedures;

7. New web-based software which will automatically record when an enclosed space entry permit was created, when it was approved by the master, and when the task is completed. With the new system, creating permits after the entry into the tank will not be possible;

8. A 'permit compliance verification' check for superintendents.

■ http://www.atsb.gov.au/media/2096584/mo2009010.pdf

MARS 201103
Fall of lifeboat during launch

In advance of a statutory survey, the master of a tanker alongside a terminal ordered the chief mate and safety officer to lower vessel's port side (offshore) lifeboat and confirm its proper operation. This was successfully carried out and the lifeboat was secured. Later that morning, in the presence of the class surveyor, the same lifeboat was lowered, when the forward fall wire parted and the empty lifeboat fell into the water.

Root cause/contributory factors

Inadequate maintenance: faulty/inadequate condition assessment, lubrication, maintenance, adjusting, assembly, cleaning and resurfacing.

Lessons learnt

1. Clear standing orders from master and chief engineer must be given for lowering of lifeboats in port and acknowledged by all officers;

2. All the officers and ratings must read and acknowledge IMO circular MSC1/Circular 1206 'Measures to prevent accident with lifeboats'.

Corrective/preventative actions

1. The details of the situation will be circulated to the fleet together with the preventative actions which need to be taken for avoiding recurrence;

2. Risk assessment procedure to be created by the company's safety department to ensure that all activities which may involve hazards are identified and appropriate actions to mitigate the risks are prescribed.

MARS 201104
Used fumigant caught fire

On one of our vessels, remnants of aluminum phosphide tablets used for fumigating cargo in holds caught fire spontaneously when stored in two drums on deck for disposal. Under stress to extinguish the fire, the crew mistakenly poured water on the burning chemical, causing a greater conflagration and release of harmful fumes. The fire eventually burned itself out, fortunately, without injury or damage.

■ **Editor's note:** The material safety data sheet (MSDS) for aluminium phosphide has the following instructions for fire-fighting:

1. Wear self-contained breathing apparatus when fighting fires involving this material;

2. If contact with the material is anticipated, wear full protective clothing;

3. Do not use water or foam. Small fires can be extinguished with dry chemical, soda ash or lime;

4. Large fires – withdraw from area and let fire burn. Move container from fire only if you can do so without risk.

MARS 201105
Improper securing of hatch covers

On one of our vessels with single wire pull-type hatch covers, the securing arrangements had become defective at some locations. Temporary securing arrangements using wire strops, senhouse slip hooks and turnbuckles were being used to secure the hatch covers in the open position. The senhouse slips were used so that if the hatch covers had to be closed in a hurry, the 'lashings' could be quickly released by knocking these open. During cargo operation, one of the senhouse slips unexpectedly opened under local vibrations, causing the hatch cover to slide rapidly and close. Fortunately no person was present in the vicinity.

Corrective/preventative actions

1. All company ships advised of incident;

2. Fleet instructed to ensure that all hatch cover securing arrangements are maintained in good condition at all times. Senhouse slips are not to be used to lash hatch covers in open position.

MARS 201106
Eye injury caused by ineffective goggles

A crew member engaged in chipping was wearing the appropriate PPE, including goggles. Despite this, he suffered eye injury when rust particles entered the goggles.

Investigations revealed that in order to overcome a shortage, the vessel had arranged to buy an additional stock of goggles from a local ship chandler. The non-standard goggles did not provide an effective seal over the nose, due to poor design.

Root cause analysis

Lack of standards: stores supplied by local ship chandler did not meet the company's quality standard.

Corrective/preventative actions

1. All vessels are to discuss the above at their next safety meeting;

2. During all toolbox meetings, personnel are to be reminded to ensure correct PPE is worn for all applications, in accordance with the company's PPE matrix, and to ensure full safety cover is provided;

3. Vessels to use company's standard supply of PPE. If additional PPE is required, this should be planned and ordered through the four-monthly stores system;

4. If the vessel receives substandard PPE through stores, other than the annual issue, this matter is to be raised directly with the purchasing department so such equipment can be exchanged for better quality equivalents and the ship chandler notified about its poor quality service;

5. If personnel discover substandard PPE in use, the equipment should be removed from service and the issue raised with the vessel's management team, superintendent and purchasing officer.

MARS 201107

Capsize of vessels carrying nickel ore, with fatalities

Condensed from *BIMCO News* 12 Nov 2010, UK P&I Club LP Bulletin 602, Nepia *Signals* no. 69)

Recently, two bulk carriers loaded with Indonesian nickel ore (sometimes also known as nickel laterite, lateritic nickel ore, limonite or saprolite, and usually shipped from Indonesia and the Philippines) sank at sea with fatalities.

The standard methods of determining the flow moisture point (FMP) of bulk cargoes which may liquefy, as stated in the International Maritime Solid Bulk Cargoes Code (IMSBC), were developed primarily for homogenised metal concentrates, whereas nickel ore is a mixture of very fine clay-like particles and larger rock particles of various sizes. Moreover, metal concentrates have a typical moisture content of about 10 per cent, whereas nickel ore often has a moisture content in the range of 25-40 per cent. These problems make it difficult to test nickel ore for liquefaction parameters.

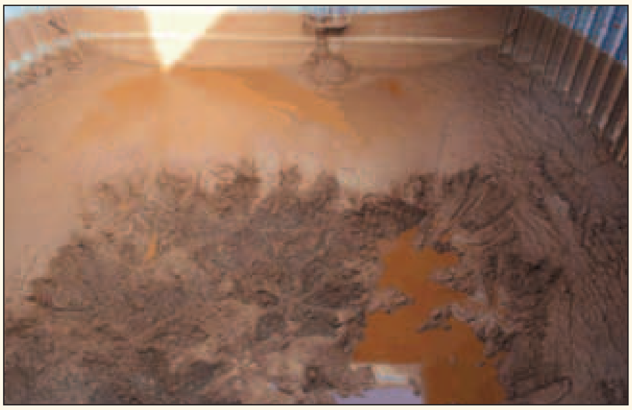
Serious doubts have been expressed about the accuracy of transportable moisture limit (TML) and moisture content (MC) data that is provided to masters at nickel ore loading ports. In many instances, the sampling and testing is carried out by the mine's in-house laboratory and the certificates only state that the material has been tested in accordance with the IMSBC flow table test (FTT) method and found to pass. No figures for the FMP and TML are stated although average MC, which is valueless without a TML, is provided. Furthermore, audits of the sampling and testing methods used by these mines have always revealed serious deficiencies, making values certified by shippers meaningless.

If the 'can test' performed by the vessel's crew indicates the likelihood of moisture migration and liquefaction, the cargo as a whole must be assumed to be unsafe for carriage regardless of shippers' certification. In many cases of Appendix A cargoes – those that are liable to liquefy – shipowners are faced with a choice of either accepting the values certified by shippers knowing that they may be unreliable, or of becoming involved in a costly investigation and possible rejection of the cargo with its attendant legal consequences. These actions are beyond the expertise and capacity of the master and an ordinary cargo surveyor and only expert attendance at the mine and in port can properly conduct the sampling and certification procedures necessary to ensure the safety of cargo, crew and vessel.

▲ Figure 1: Typical shape of sample cone prior to testing

▲ Figure 2: Change in shape of sample cone after testing, corresponding to a 6.5mm cone expansion

▲ Figure 3: Sample cone after testing with 20mm expansion at base



▲ Figure 4: Liquefied lateritic nickel ore

In a recent case, it was found that the mine, in clear violation of the IMSBC, did not routinely sample the stockpiles prior to shipment, but rather the sampling was conducted during the course of loading. This data was then presented to the master of the next vessel to load at the terminal. In turn, the results of the analysis of the cargo loaded on board the subject vessel would then be presented to the next ship and so on. Due to this illegal practice, the master would have been totally unaware of the fact that he was carrying a cargo for which the documentation was deliberately false, and that despite acceptable parameters on the certificate, the cargo could very well liquefy and potentially capsize the vessel.

The interval between sampling/testing and loading must never be more than seven days. If the cargo has been exposed to significant rain or some form of moisture between the times of testing and loading, further tests shall be conducted to ensure that the MC is still less than the cargo's TML, which is generally determined as 90 per cent of FMP.

Mariners must remember the simple relationship MC < TML < FMP. Only if the MC is significantly less than the TML can the cargo be considered to be safe to load. It is also important not to confuse the commercial MC with FMP. Even though a receiver may be willing to accept cargo with a MC of 35 per cent by weight, it can only be accepted by the vessel if this is well below TML.

In the laboratory, the FMP is determined by adding water to a stock sample of nickel ore until a flow state is determined. The FTT method involves preparing a sample on a flow table in the form of a truncated cone. The flow table top is then raised and allowed to fall sharply through a defined vertical distance. This simple procedure is repeated up to 50 times and the behaviour of the sample cone observed to see if 'plastic deformation' has occurred. However, the IMSBC states that the method may 'not give satisfactory results for some materials with high clay content', which means that great care is required in performing the test for nickel ore.

Appendix 2 of the IMSBC Code (2009) states: 'A flow state is considered to have been reached when the moisture content and compaction of the sample produce a level of saturation such that plastic deformation occurs. At this stage, the moulded sides of the sample may deform, giving a convex or concave profile'.

Figure 1 illustrates the shape of a sample cone for a sample below FMP, while Figure 2 shows the shape of a sample cone after recent testing with a MC of about 31 per cent. Despite the cone being deformed, with a recorded cone expansion >6mm, it was regarded as being below FMP. The sample was not failed until the cone had expanded by a massive 20mm, as shown in Figure 3, with a declared FMP of 33.8 per cent. The mine was unable to justify their change of methodology, which ignored all the key indicators of a flow state (see page 300 of the IMSBC Code: **Editor**), and enabled them to ship wetter cargo at a greater risk to the vessel.