

THE CARRIAGE OF HAZARDOUS AND NOXIOUS SUBSTANCES ON SHIPS

ΚΟΛΥΒΑ ΕΙΡΗΝΗ-ΒΑΣΙΛΕΙΑ
ΑΓΜ: 3305

ΑΚΑΔΗΜΙΑ ΕΜΠΟΡΙΚΟΥ ΝΑΥΤΙΚΟΥ ΜΑΚΕΔΟΝΙΑΣ
ΣΧΟΛΗ ΠΛΟΙΑΡΧΩΝ



**ΑΚΑΔΗΜΙΑ ΕΜΠΟΡΙΚΟΥ ΝΑΥΤΙΚΟΥ
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ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ

ΕΠΙΒΛΕΠΟΥΣΑ ΚΑΘΗΓΗΤΡΙΑ: ΠΑΝΑΓΟΠΟΥΛΟΥ ΜΑΡΙΑ

ΘΕΜΑ

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**ΤΗΣ ΣΠΟΥΔΑΣΤΡΙΑΣ: ΚΟΥΒΑ ΕΙΡΗΝΗ-ΒΑΣΙΛΕΙΑ
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<i>1</i>				
<i>2</i>				
<i>3</i>				
ΤΕΛΙΚΗ ΑΞΙΟΛΟΓΗΣΗ				

Ο ΔΙΕΥΘΥΝΤΗΣ ΣΧΟΛΗΣ: ΤΣΟΥΛΗΣ ΝΙΚΟΛΑΟΣ

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1. INTRODUCTION

The history of the carriage of dangerous goods by sea is as old as mankind itself. The dangers inherent in the carriage of such goods have grown with the passage of time and the development of new technologies. In the days of the sailing vessel, the hazards of the sea were so great, due to the smallness of the ship, that the danger to the cargo alone was negligible. In many cases, the operator of the ship was either unaware that he was carrying dangerous goods or was transporting a single commodity and had taken the necessary precautions. The only dangerous goods were rum, brandy and gunpowder. They were dangerous not by virtue of the substance but the combination. Although it might have been slightly uncomfortable to be near an exploding gunpowder cargo, the danger was rather limited.



Picture 1 Container ship

Today much of this has changed. An ever increasing number of goods are moved by sea at the present time. For many of these goods, the ship provides the most feasible mode of transport. Moreover, world trade depends to a large extent on the transport of dangerous goods. It is estimated that more than 50% of packed goods and bulk cargoes transported by sea today can be regarded as dangerous, hazardous or harmful to the environment. The cargoes concerned include products which are transported in bulk, such as solid or liquid chemicals, and other materials, gases and products for and from the oil-refinery industry, and wastes. Some of these substances, materials and articles are dangerous or hazardous from a safety point of view and are also harmful to the marine environment; others are only hazardous when carried in bulk and some may be considered as harmful to the marine environment. Between 10%-15% of cargoes transported in packed form, including shipborne barges on barge-carrying ships, freight containers, bulk packaging, portable tanks, tank-containers, road tankers, swap-bodies, vehicles, trailers, intermediate bulk containers (IBCs), unit loads and other cargo transport units, fall under this criterion.

The recent growth registered in the carriage of dangerous goods has been attributed to a number of factors. One factor is that some commodities are no longer available in sufficient quantities and have been replaced by synthetic materials. The production of synthetic materials often requires the use of dangerous substances. This, in turn, leads to an increase in the carriage of dangerous substances both in bulk and in packed form. A second, yet related factor is the development of new technologies, which has increased the production of dangerous goods which can be carried by sea. The development of different chemicals in increasing amounts has also resulted in the development of new types of packing. A few decades ago, the bulk of chemical products were carried in packed form or in general cargo ships. An increasing number of ships are presently dedicated to one type of cargo. There are now in operation chemical product carriers, container ships, vessels carrying tank containers, ro-ro vessels loading tank vehicles, lash ships and bulk carriers.

Dangerous goods as a category makes legal sense only if rules attached to it are different from those governing cargo in general and there are rules based on the concept of "dangerous goods." Worldwide concern with the risks posed by the increased frequency in the carriage of dangerous goods by sea has led to the progressive formulation and adoption of international technical standards to promote maritime safety. As a rule, maritime transport forms part of a chain which may include a number of other modes of transport. Goods may, for instance, be delivered to ports by trains or trucks before being transferred on board ship. At the port of delivery, the goods must be unloaded and delivered to their final destination. This necessitates, at least, that the basic rules applying to packed goods should be identical for all modes of transport.

During recent years there have been comparatively few major accidents at sea involving dangerous goods, with the exception of accidents involving oil tankers and bulk carriers. Nevertheless, dangerous cargoes have been involved in some of the worst disasters in shipping history and relatively small incidents involving dangerous goods occur frequently. The majority of the cases where the misfortune caused by dangerous goods is less momentous in the sense that they are shared only by the parties to the maritime adventure, so they fail to become a public concern. Both situations, nonetheless, highlight the hazards associated with dangerous goods whose shipment is liable to cause loss or damage. Thus, the multiplicity of dangerous goods and the multifarious dangers they present make legal regulation of the carriage of dangerous goods inevitable.

The purpose of this study is to examine the relevant issues regarding the carriage of dangerous goods by sea. The study starts by describing the background and development of dangerous goods regulations. The meaning of dangerous goods is given special attention, as the term in practice is used very widely to cover both dangerous goods within the framework of dangerous goods regulations as well as any goods that may cause damage. The study mainly focuses on the contractual relationship between shipper and carrier and on the most commonly carried dangerous goods. Afterwards, the parties' respective duties with regard to dangerous goods, rights and liabilities are broadly examined.

2. DANGEROUS GOODS REGULATIONS

2.1 ROLE OF IMO

Shipping is one of the most international and dangerous industries in the world. It has always been recognized that the best way of improving safety at sea is to formulate international regulations that are followed by all shipping nations. The Convention establishing the International Maritime Organization (IMO) was adopted on 6 March 1948 by the United Nations Maritime Conference. The convention entered into force on 17 March 1958. The new Organization was inaugurated on 6 January 1959, when the Assembly held its first session. The purpose of the Organization is defined in Art.1 of the IMO Convention. This article stipulates that: *Machinery for cooperation among governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and the prevention and control of marine pollution from ships; and to deal with administrative and legal matters related to the purpose set out in this Article.*

In order to achieve its objectives, IMO has promoted the adoption of about 40 conventions and protocols. In addition to conventions and other treaty instruments, IMO also adopts numerous non-treaty instruments such as codes and recommendations, which are adopted by the Assembly, Maritime Safety Committee and the Marine Environment Protection Committee. IMO's first task since it came into being in 1959 was to adopt a new version of International Convention for the Safety of Life Sea at Sea (SOLAS). The transport of dangerous goods has been one of its responsibilities since then.

Within the Sub-Division for marine technologies and cargoes, IMO staff responsible for cargoes matters deal with all technical and operational matters related to the following subjects, including the development of any necessary amendments to relevant conventions and other mandatory and non-mandatory instruments, as well as the preparation of new mandatory and non-mandatory instruments, guidelines and recommendations, for consideration by the Sub-Committee on Carriage of Cargoes and Containers (CCC) (under the direct instructions of the Maritime Safety Committee and the Marine Environment Protection Committee):

1. Effective implementation of the relevant conventions, codes and other instruments, mandatory or recommendatory, as appropriate, dealing with cargo operations, which include packaged dangerous goods, solid bulk cargoes, bulk gas cargoes, and containers;
2. Evaluation of safety and pollution hazards of packaged dangerous goods, solid bulk cargoes and gas cargoes
3. Survey and certification of ships carrying hazardous cargoes;
4. Further enhancement of the safety and security culture, and environmental consciousness in all cargo and container operations; and
5. Cooperation with other relevant UN bodies, IGOs and NGOs on international standards related to containers and to cargo operations.



Picture 2.1 IMO sign

The conventions and other mandatory instruments (as may be amended from time to time) referred to above include, but are not limited to:

1. 1974 SOLAS Convention (chapters VI and VII and other relevant parts, as appropriate);
2. MARPOL (Annexes III and V, as appropriate);
3. International Convention for Safe Containers (CSC), 1972;
4. International Maritime Dangerous Goods (IMDG) Code and related supplements;
5. International Maritime Solid Bulk Cargoes (IMSBC) Code and related supplements;
6. International Code for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk (IGC Code);
7. International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board Ships (INF Code);
8. International Code for the Safe Carriage of Grain in Bulk; and
9. Code of Safe Practice for Cargo Stowage and Securing (CSS Code).

The non-mandatory instruments, referred to in paragraph 1, which the Sub-Committee may be called upon to review, include, but are not limited to:

- A. Code of Safe Practice for Solid Bulk Cargoes (BC Code);
- B. Code for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk (GC Code);
- C. Code of Safe Practice for Ships Carrying Timber Deck Cargoes;
- D. Code Safe Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code);
- E. Recommendations on Safe Transport of Dangerous Cargoes and related Activities in Port Areas;
- F. Guidelines for the Preparation of the Cargo Securing Manual;
- G. Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide);
- H. Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG);
- I. Reporting procedures, including inspection programs for cargo transport units carrying dangerous goods; reporting of incidents involving harmful substances and/or marine pollutants; reporting of casualties involving dangerous cargoes
- J. IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units;
- K. Recommendations on the Safe Use of Pesticides in Ships; and any recommendations and guidelines relevant to the carriage of bulk cargoes.

2.2 SOLAS CONVENTION

In the first Convention for the Safety of Life at Sea (SOLAS 1914), “the carriage of goods which by reason of their nature, quantity and mode of stowage” were likely to endanger the lives of the passengers or the safety of the ship was in principle forbidden. However, the decision as to which goods were “dangerous” was left to the Contracting Governments, which were also requested to advice on the precautions which should be taken in the packing and mode of transport, i.e. stowage and segregation of such goods. The latter seems to imply that, if these precautions were followed, the transport of these goods would be permitted and could be regarded as being safe.

Although SOLAS 1914 never entered into force, the principle of relying on national administrations and relevant authorities to decide on the definition and treatment of dangerous goods was established and, unfortunately, resulted in the development of many diversified regulations and practices embedded in national, regional or individual out-of-date port regulations. The same attitude was maintained in the SOLAS Conference 1929, in Article 24 of which “Dangerous Goods” are mentioned



Picture 2.2 Vessel

together with “Life-Saving Appliances”. It was still forbidden to carry goods which by their nature, quantity and mode of stowage were liable to endanger the lives of the passengers or the safety of the ship. Moreover, it was still left to each administration to determine which goods were to be considered dangerous and to indicate the precautions which had to be taken in their packing and mode of stowage. The 1929 Convention entered into force in 1933. In 1948, a new attempt was made to formulate safety standards for the carriage of dangerous goods. Thus up to the time of the 1949 SOLAS Conference it was forbidden to carry dangerous goods in ships unless due precautions were taken. The lack of enthusiasm in bringing these instruments into force demonstrates what little importance was attached to the question. Indeed, the quantity of dangerous goods carried by sea was relatively small at the time. But by 1948, when the third SOLAS Conference was held in the wake of World War II, the perception of the subject under discussion had visibly changed. Sea traffic had considerably grown and more cargoes were being transported which could be considered dangerous. The War itself had given much impetus to the transport of these substances, and in the post-war years industrial needs and technological innovations contributed to a further increase. This expansion led to rethinking and, as a result, a new Chapter VI was added to the 1948 SOLAS Convention, dealing specifically with the “Carriage of Grain and Dangerous Goods”.

However, the Conference recognized that the provisions of the 1948 SOLAS Convention were inadequate. It therefore adopted Recommendation 22 to stress the importance of international uniformity in the safety precautions applied to the transport of dangerous goods by sea and noted that certain countries with an extensive export trade in chemicals had already adopted detailed regulations. In addition to stressing the need for international uniformity in safety precautions, the Conference also established that goods should be considered dangerous on the basis of their properties and characteristics and a labelling system should be developed using distinctive symbols indicating the kind of danger for each class of substances, materials and articles. Recommendation 22 additionally urged that further study be undertaken with a view to developing uniform international regulations on the subject. However, despite these efforts, there was no common basis for the different modes of transport to work together to develop rules on dangerous goods. This situation changed in 1956, when the United Nations Committee of Experts on the Transport of Dangerous Goods (CETDG) completed a report which established the minimum requirements

applicable for the transport of dangerous goods by all modes. This report, *United Nations Recommendations on the Transport of Dangerous Goods*, offered the general framework within which existing regulations could be adopted and developed, the ultimate aim being world-wide uniformity across all modes of transport. The United Nations Recommendations have been amended and updated by succeeding sessions of the Committee of Experts and published in accordance with subsequent resolutions of the United Nation Economic and Social Council (“ECOSOC”).

However, despite the publication of the United Nations Recommendations, as far as maritime transport was concerned, little was done in response to Recommendation 22. In 1960, the conference took place to revise SOLAS 1948. Chapter VII of the revised 1960 SOLAS Convention, which entered into force on 26 May 1965, dealt exclusively with the carriage of dangerous goods. Another conference, held in 1974, further revised the Convention and the 1974 SOLAS version entered into force on 25 May 1980. It has been subsequently modified and amended. Several amendments to SOLAS 1974 concerning the carriage of dangerous goods have also been adopted since then.

The revised Chapter VII now applies to all ships covered by SOLAS and also to cargo ships of less than 500 gross tonnage. Chapter VII of SOLAS 1974 is comprehensive in nature. It deals with dangerous goods in packaged form as well as with bulk cargoes. Part A deals with the carriage of dangerous goods in packaged form. Regulation 2.3 prohibits the carriage of dangerous goods by sea except when they are carried in accordance with the provisions of the SOLAS Convention and Regulation 3 requires the carriage of dangerous goods in packaged form to be in compliance with the relevant provisions of the International Maritime Dangerous Goods Code (IMDG Code). Regulation 2.4 requires each Contracting Government to issue, or cause to be issued, detailed instructions on emergency response and medical first aid relevant to incidents involving dangerous goods in packaged form. Part A-1 is concerned with the carriage of dangerous goods in solid form in bulk. Part B covers construction and equipment of ships carrying liquid chemicals in bulk and requires chemical tankers built after July 1986 to comply with the International Bulk Chemical Code (IBC Code), while Part C covers construction and equipment of ships carrying liquefied gases in bulk and gas carriers constructed after 1 July 1986 to comply with the requirements of the International Gas Carrier Code (IGC Code). Part D includes special requirements for the carriage of packaged irradiated nuclear fuel, plutonium and high-level radioactive waste on board ships and requires ships carrying such products to comply with the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Waste on Board Ships (INF Code).

ANALYSIS OF SOLAS REGULATIONS

Part A Carriage of dangerous goods in packaged form or in solid form in bulk

Regulation 1 Application

1. Unless expressly provided otherwise, this part applies to dangerous goods classified under regulation 2 which are carried in packaged form or in solid form in bulk (hereinafter referred to as “dangerous goods”), in all ships to which the present regulations apply and in cargo ships of less than 500 gross tonnage.
2. The provisions of this part do not apply to ships’ stores and equipment.
3. The carriage of dangerous goods is prohibited except in accordance with the provisions of this part. In addition, the requirements of part D shall apply to the carriage of INF cargoes as defined in regulation 14.2.
4. The carriage of dangerous goods, including classification, packaging, marking, documentation, stowage and separation, shall, unless otherwise decreed by the Danish Maritime Authority, be carried out in compliance with the International Maritime Dangerous Goods Code (the IMDG Code) drawn up by the Organization, with its most recent

amendments, and in such a way that the recommendations contained in the IMDG Code are followed or, if applicable, the “Memorandum on the carriage of dangerous goods by ro-ro ships in the Baltic area (the “Baltic Agreement”, also called the “Baltic Memorandum”).

5. Dangerous goods not listed in the IMDG Code shall be classified with reference to the IMDG Code, Part 2. Classification and the guidelines for classification in the UN’s “Recommendations on the Transport of Dangerous Goods” (the orange book).
 - i. The goods shall be marked in accordance with their properties as prescribed in the IMDG Code.
 - ii. The goods shall be packaged as prescribed in the IMDG Code for the class in question.
 - iii. The goods shall be documented as prescribed in the IMDG Code.
 - iv. The stowage of the goods shall be approved by the Danish Maritime Authority.
 - v. Separation of the goods shall be carried out as prescribed in Part 7.2 of the IMDG Code.
6. The following regulations shall be available on board all ships carrying dangerous goods:
 - a) The IMDG-Code with the most recent amendments. With regard to ships that carry dangerous goods only in exceptional cases or frequently carry particular kinds of dangerous goods, it will, however, be sufficient if only the information from the IMDG Code necessary for the safe carriage of the goods in question is on board.
 - b) Emergency Procedures for Ships Carrying Dangerous Goods (EMS Plans) with the most recent amendments.
 - c) Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) with the most recent amendments.

Regulation 2 Classification

Dangerous goods shall be divided into the following classes:

Class 1 Explosives

Class 2 Gases: compressed, liquefied or dissolved under pressure

Class 3 Flammable liquids

Class 4.1 Flammable solids

Class 4.2 Substances liable to spontaneous combustion

Class 4.3 Substances which in contact with water emit flammable gases

Class 5.1 Oxidizing substances

Class 5.2 Organic peroxides

Class 6.1 Toxic substances

Class 6.2 Infectious substances

Class 7 Radioactive materials

Class 8 Corrosives

Class 9 Miscellaneous dangerous substances and articles, i.e. any other substance which experience has shown, or may show, to be of such a dangerous character that the provisions of this part shall apply to it.



Picture 2.2.1 Labels, marks and signs

Regulation 3 Packaging

❖ The packaging of dangerous goods shall be:

- 1) Well-made and in good condition
- 2) Of such a character that any interior surface with which the contents may come in contact is not dangerously affected by the substance being conveyed; and
- 3) Capable of withstanding the ordinary risks of handling and carriage by sea.

- ❖ Where the use of absorbent or cushioning material is customary in the packaging of liquids in receptacles, that material shall be:
 - a. Capable of minimizing the dangers to which the liquid may give rise;
 - b. So disposed as to prevent movement and ensure that the receptacle remains surrounded; and
 - c. Where reasonably possible, of sufficient quantity to absorb the liquid in the event of breakage of the receptacle
- ❖ Receptacles containing dangerous liquids shall have an ullage at the filling temperature sufficient to allow for the highest temperature during the course of normal carriage.
- ❖ Cylinders or receptacles for gases under pressure shall be adequately constructed, tested, maintained and correctly filled.
- ❖ Empty uncleaned receptacles which have been used previously for the carriage of dangerous goods shall be subject to the provisions of this part for filled receptacles, unless adequate measures have been taken to nullify any hazard.

Regulation 4 Marking, labelling and placarding

1. Packages containing dangerous goods shall be durably marked with the correct technical name; trade names alone shall not be used.
2. Packages containing dangerous goods shall be provided with distinctive labels or stencils of the labels, or placards, as appropriate, so as to make clear the dangerous properties of the goods contained therein. The method of marking the correct technical name and of affixing labels or applying stencils of labels, or of affixing placards on packages containing dangerous goods, shall be such that this information will still be identifiable on packages surviving at least three months' immersion in the sea. In considering suitable marking, labelling and placarding methods, account shall be taken of the durability of the materials used and of the surface of the package.
3. Packages containing dangerous goods shall be so marked and labelled except that:
 - i. packages containing dangerous goods of a low degree of hazard or packed in limited quantities;
 - ii. when special circumstances permit, packages that are stowed and handled in units that are identified by labels or placards;1) may be exempted from labelling requirements.



Picture 2.2.2 Labels, placards and markings

Regulation 5 Documents

1. In all documents relating to the carriage of dangerous goods by sea where the goods are named, the correct technical name of the goods shall be used (trade names alone shall not be used) and the correct description given in accordance with the classification set out in regulation 2.
2. The shipping documents prepared by the shipper shall include, or be accompanied by, a signed certificate or declaration that the shipment offered for carriage is properly packaged and marked, labelled or placarded, as appropriate, and in proper condition for carriage.
3. The persons responsible for the packing of dangerous goods in a freight container or road vehicle shall provide a signed container packaging certificate or vehicle packing declaration stating that the cargo in the unit has been properly packed and secured and that all applicable transport requirements have been met. Such a certificate or declaration may be combined with the document referred to in paragraph 2.

4. Where there is due cause to suspect that a freight container or road vehicle in which dangerous goods are packed is not in compliance with the requirements of paragraph 2 or 3, or where a container packing certificate or vehicle packing declaration is not available, the freight container or vehicle shall not be accepted for shipment.
5. Each ship carrying dangerous goods shall have a special list or manifest setting forth, in accordance with the classification set out in regulation 2, the dangerous goods on board and the location thereof. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods on board, may be used in place of such a special list or manifest. A copy of one of these documents shall be made available before departure to the person or organization designated by the port State authority.
6. In ships carrying dangerous goods, such information shall be available to the crew.
7. With regard to the documents referred to in paragraphs 1 and 2, reference is made to Part 5 of the IMDG Code. An example of IMO's Multi Modal Dangerous Goods Form is shown in part 5.4.5.
8. Where the carriage has been documented in accordance with the regulations of RID/ADR and the carriage is carried out in compliance with the "Baltic Agreement"; alternative reference is made to the provisions on documentation in RID/ADR.

Regulation 6 Stowage requirements

1. Dangerous goods shall be loaded, stowed and secured safely and appropriately in accordance with the nature of the goods. Incompatible goods shall be segregated from one another.
2. Explosives (except ammunition) which present a serious risk shall be stowed in a magazine which shall be kept securely closed while at sea. Such explosives shall be segregated from detonators. Electrical apparatus and cables in any compartment in which explosives are carried shall be so designed and used as to minimize the risk of fire or explosion. Electrical installations in spaces where explosive goods are stowed shall, unless exclusively explosion-proof fittings are used, be kept voltage-free during loading, unloading and carriage.
3. Dangerous goods in packaged form which give off dangerous vapors shall be stowed in a mechanically ventilated space or on deck. Dangerous goods in solid form in bulk which give off dangerous vapors shall be stowed in a well ventilated space. When stowing, necessary consideration shall be taken of the risk of dangerous vapors percolating into accommodation spaces.
4. In ships carrying flammable liquids or gases, special precautions shall be taken where necessary against fire or explosion
5. Substances which are liable to spontaneous heating or combustion shall not be carried unless adequate precautions have been taken to minimize the likelihood of the outbreak of fire.
6. Hydrants, sounding tubes and similar devices, and access to them, shall be kept free and clear of deck cargo.
7. During loading and unloading of dangerous goods, the necessary precautions shall be taken to prevent accidents, according to circumstances.

Regulation 7 Explosives in passenger ships

1. Explosives in division 1.4, compatibility group S, may be carried in any amount in passenger ships. No other explosives may be carried except any one of the following:
 - a) explosive articles for life-saving purposes, if the total net explosives mass of such articles does not exceed 50 kg per ship; or
 - b) explosives in compatibility groups C, D and E, if the total net explosives mass does not exceed 10 kg per ship; or
 - c) explosive articles in compatibility group G other than those requiring special stowage, if the total net explosives mass does not exceed 10 kg per ship; or

- d) explosive articles in compatibility group B, if the total net explosives mass does not exceed 5 kg per ship.
 - e) articles in compatibility group N shall only be allowed in passenger ships if the total net explosive mass does not exceed 50 kg per ship and no other explosives, apart from division 1.4 compatibility group S, are carried.
2. Notwithstanding the provisions of paragraph 1, additional quantities or types of explosives may be carried in passenger ships in which special safety measures approved by the Administration are taken.

Regulation 7-1 Reporting of incidents involving dangerous goods

- 1) When an incident takes place involving the loss or likely loss overboard of dangerous goods into the sea, the master, or other person having charge of the ship, shall report the particulars of such an incident without delay and to the fullest extent possible to the nearest coastal State. The report shall be based on the guidelines and general principles adopted by the Organization
- 2) In the event of the ship referred to in paragraph 1 being abandoned, or in the event of a report from such a ship being incomplete or unobtainable, the owner, charterer, manager or operator of the ship, or their agents shall, to the fullest extent possible, assume the obligations placed upon the master by this regulation.

Part AA Carriage of dangerous goods by ro-ro ships

Regulation I Special provisions for ro-ro ships

- 1. In passenger ships and in ro-ro cargo ships carrying ro-ro goods in accordance with the memorandum on the carriage of dangerous goods by ro-ro ships in the Baltic, the master shall, with a view to proper stowage of dangerous goods, if any, prior to boarding of vehicles, check the nature of goods in all ro-ro units, lorries, trailers, railway wagons etc. This check of the nature of goods may be carried out on the basis of the documentation/declaration pertaining to the ro-ro unit and the marking of the unit or on the basis of a declaration issued by the lorry driver, railway personnel or terminal personnel to the effect that the unit does not contain dangerous goods. The above check may, however, be omitted if a proper system has been established for the sorting and control of goods before boarding. Information on such schemes in Denmark shall, before the check can be dispensed with, be submitted to the Danish Maritime Authority.
- 2. With regard to tank lorries, railway tank wagons or tank containers that contain dangerous goods or have not been cleaned since they last contained dangerous goods, in addition to the declaration referred to in regulation 5, paragraph 2, a declaration shall be presented on boarding issued by the lorry driver, the railway personnel or the terminal personnel, stating that the wagon or container was tight immediately prior to boarding. If the wagon or container is provided with durable marking referring to its dangerous goods content, even though it has been cleaned or has not most recently contained dangerous goods, a corresponding declaration hereof shall be issued.
- 3. With regard to lorries, railway wagons or containers containing dangerous goods – including, if applicable, various kinds of dangerous goods – in addition to the declaration referred to in regulation 5, paragraph 2, a declaration shall be presented on boarding issued by the lorry driver, the railway personnel or the terminal personnel to the effect that the wagon or container was correctly stowed immediately prior to the boarding. If the wagon or container is provided with durable marking referring to its dangerous goods content, however empty, a corresponding declaration shall be issued.

2.3 THE MARPOL CONVENTION

The International Convention for the Prevention of Pollution from Ships (MARPOL Convention) is the main international convention covering the prevention of pollution of the marine environment by ships through operational and accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments throughout the years. The MARPOL Convention covers pollution by oil, chemicals, harmful substances in packaged form, sewage and garbage. The MARPOL Convention includes regulations aimed at preventing and minimizing pollution from ships and includes six technical Annexes.

Annex III to the MARPOL Convention contains general requirements relating to the prevention of pollution by harmful substances carried at sea in packaged form or in freight containers, portable tanks or road and rail tank wagons. The objective behind the regulations contained in Annex III of MARPOL was to identify marine pollutants so that they could be packed and stowed on board ships in such a way as to minimize accidental pollution as well as to aid recovery by using clear marks to distinguish them from other (less harmful) cargoes. The rule on discharging harmful goods was straightforward: *“Jettisoning of harmful substances carried in packaged form shall be prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea”*. The Annex requires the issuing of detailed standards on packaging, marking, labelling, documentation, stowage, quantity, limitations, exceptions and notifications, for preventing and minimizing pollution by harmful substances.



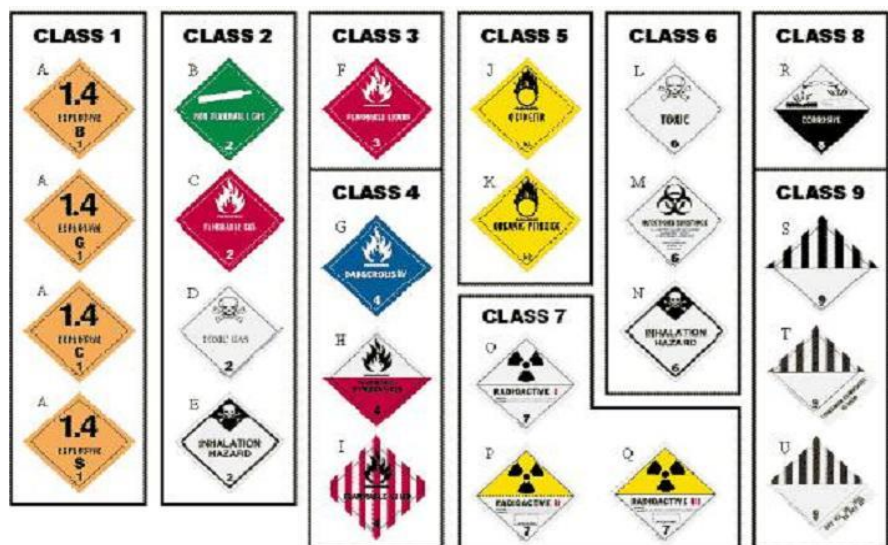
Picture 2.3.1 Loss of stability due to mistaken stowage

However, implementation of the Annex was initially hampered by the lack of a clear definition of harmful substances carried in packaged form. This was remedied by amendments to the IMDG Code to include marine pollutants. Annex III of MARPOL was also amended at the same time, to make it clear that “harmful substances” are those substances which are identified as marine pollutants in the IMDG Code.

2.4 IMDG CODE

Resolution 56, adopted at the 1960 SOLAS Conference, recommended that governments should adopt a uniform international code for the carriage of dangerous goods by sea which should supplement the SOLAS regulations and cover such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances. Furthermore, it recommended that IMO, in co-operation with the CETDG, should pursue its studies on such an international code, especially in respect of classification, description, labelling, a list of dangerous goods and shipping documents. To fulfill this, in January 1961, IMO's Maritime Safety Committee established a working group on the Carriage of Dangerous Goods (CDG). Governments with considerable experience in the carriage of dangerous goods were invited to nominate experts. The Group agreed to prepare the "unified international maritime code" as indicated by the SOLAS Conference. Preliminary drafts for each class were compiled by individual national delegations and then considered by the Group, which took into account the practices and procedures of numerous

maritime countries in order to make such a code as widely acceptable as possible. Close co-operation was established with the UN Committee of Experts on Transport of Dangerous Goods. By 1965 the International Maritime Dangerous Goods Code had been prepared and was adopted by the fourth IMO Assembly in the same year. Since its introduction in 1965, the IMDG Code has undergone many changes to



Picture 2.4.1 Classification of dangerous goods according to IMDG Code

keep pace with the ever-changing needs of industry. In 1985, the IMO decided to extend the IMDG Code to marine pollutants. The reason was to assist the implementation of Annex III of the MARPOL 73/78 through the IMDG Code. Moreover, the IMDG Code was re-formatted in 2001 to align with the UN Model Regulations on the Transport of Dangerous Goods as well as the other modal regulations governing the movement of dangerous goods by air, road, rail and inland waterway, which have also recently been harmonized with the UN requirements. Alignment of the various modal rules is seen as an important step in the drive to simplify the carriage of dangerous goods and streamline international multimodal transport operations. The IMO addressed the lack of international uniformity in the field of dangerous goods by producing the IMDG Code. The Code attempted to pull together the many varying customary rules and procedures related to the carriage of dangerous goods at sea. Other transport modes were also consulted. For the first time a uniform system of labelling and presenting other information on the nature of dangerous goods was developed. A comprehensive list of dangerous, hazardous and noxious substances was also created. Underwriters quickly noted the benefits of the Code and shippers stipulated carriage according to the Code.

However, from the legal point of view the IMDG Code was of only limited benefit. IMO Member States are entitled to participate in the adoption of resolutions by the IMO Assembly, the MSC and the MEPC, which recommend the implementation of technical rules and standards not included in IMO treaties. Parties to the UNCLOS are expected to conform to these rules and standards, obviously bearing in mind the need to adapt them to the particular circumstances of each case. Accordingly, the IMDG Code was basically a recommendation to governments for adoption or use

as the basis for national regulations in pursuance of their obligations under SOLAS 1974 and MARPOL 73/78.³⁶ If a state had decided to adopt the Code into its own regulatory system, it could have done so, but that mechanism would then have been applicable only to that state's vessel's and/or ports.

Application and implementation of the IMDG

The provisions of the IMDG Code are applicable to all ships to which SOLAS 1974 applies and which are carrying dangerous goods as defined in Chap. VII.1 of that Convention. The provisions of Reg. II-2/19 apply to passenger ships and to cargo ships constructed on or after 1 July 2002. For:

- a passenger ship constructed on or after 1 September 1984 but before 1 July 2002
 - a cargo ship of 500 gross tons or over constructed on or after 1 September 1984 but before 1 July 2002
 - a cargo ship of less than 500 gross tons constructed on or after 1 February 1992 but before 1 July 2002
- the requirements of Regulations II-2/54 of SOLAS apply. For cargo ships of less than 500 gross tons constructed on or after 1 September 1984 and before 1 February 1992, it is recommended that contracting governments extend such application to these cargo ships as far as possible. On the other hand, all ships, irrespective of type and size, carrying substances, materials or articles identified in this Code as marine pollutants are subject to the provisions of this Code. Although primarily designed for mariners, the provisions of the IMDG Code affect a number of industries as well as storage, handling and transport services from manufacturers to consumers. Chemical and packaging manufacturers, packers, shippers, forwarders, carriers and terminal operators are guided by its provisions on classification, terminology, identification, packing and packaging, marking, labelling and placarding, documentation and marine pollution aspects. Feeder services, such as road, harbour and inland water craft are guided by its provisions. Port authorities, as well as terminal and warehousing companies, consult the IMDG Code to segregate and separate dangerous cargoes in loading, discharge and storage areas.

OTHER CODES

I. The IBC Code

The transportation by sea of liquid chemicals in bulk has developed in line with the increasing number of by-products from petroleum refineries. The carriage of chemicals in bulk is covered by regulations in SOLAS Chapter VII, Carriage of Dangerous Goods, and MARPOL Annex II, Regulation for the Control of Pollution by Noxious Liquid Substances in Bulk. Both Conventions require chemical tankers built after 1 July 1986 to comply with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code). Chemical tankers built before 1 July 1986 should comply with the requirements of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code).

The purpose of the Code is to provide an international standard for the safe transport by sea in bulk of liquid dangerous chemicals, by prescribing the design and construction standards of ships regardless of tonnage involved in such transport and the equipment they should carry so as to minimize the risks to the ship, its crew and to the environment, having regard to the nature of the products carried. The Code primarily deals with ship design and equipment. In order to ensure the safe transport of the products, the total system must be appraised. The layout of the IBC Code is in line with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk. Gas carriers may also carry in bulk liquid chemicals covered by the IBC Code. The IBC Code is mandatory both under Annex II of MARPOL 73/78 and Chapter VII, Part B of SOLAS 1974.

II. The IGC Code

Severe collisions or strandings could lead to cargo tank damage and uncontrolled release of the product. Such release could result in evaporation and dispersion of the product and, in some cases, could cause fracture of the ship's hull. The requirements in the code are intended to minimize these risks as far as is practicable, based upon present knowledge and technology. The Code applies to gas carriers constructed on or after the entry into force of Chap.VII.C of SOLAS 1974 contained in the 1983 amendments to the 1974 SOLAS Convention, i.e. 1 July 1986. Gas carriers constructed before that date should comply with requirements of the Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) or the Code for Existing Ships Carrying Liquefied Gases in Bulk. The purpose of these codes is to provide an international standard for the safe transport by sea in bulk of liquefied gases and certain other substances. The IGC Code is also mandatory under Annex II of MARPOL and Chap.VII.C of SOLAS 1974.

III. The INF Code

The International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Water on Board of Ships (INF Code) was adopted by Resolution MSC.88 (71) in 1999 and became mandatory on 1 January 2001 by amendments adapted to Chapter VII of SOLAS. Complementing the IMDG Code and IAEA Regulations, the INF Code sets standards above those set by the SOLAS Convention for conventional ships. These enhanced standards apply to the design and operation of ships carrying materials included in the Code. The materials covered by the Code include irradiated nuclear fuel, plutonium and high-level radioactive waste. Specific regulations in the Code cover a number of issues, including damage stability, fire protection, temperature control of cargo spaces, structural considerations, cargo-securing arrangements, electrical supplies, radiological protection equipment and management, training and shipboard emergency plans.

IV. The BC Code

Millions of tons of cargoes, such as coal, concentrates, grains, fertilizers, animal foodstuff, minerals and ores, are shipped in bulk by sea every year. While the vast majority of these shipments are made without incident, there have been a number of serious accidents which have resulted not only in the loss of the ship, but also in loss of life. The problems involved in the transport of solid bulk cargoes were recognized by the 1960 SOLAS Conference, but at that time it was not possible to frame detailed requirements except for the transport of grain cargoes. However, it was agreed that an internationally acceptable Code of Safe Practice for the Shipment of Bulk Cargoes should be drawn up and in 1965 the first Code of Safe Practice for Bulk Cargoes (BC Code) was adopted by the IMO. The BC Code itself provides guidance to administrations, ship owners, shippers and masters on the standards to be applied in the safe stowage and shipment of solid bulk cargoes excluding grain, which is dealt with under separate rules. The BC Code includes practical guidance on the procedures to be followed and the appropriate precautions to be taken in the loading, trimming, carriage and discharge of bulk cargoes. The primary aim of BC Code is to promote safe stowage and shipment by:

- (1) highlighting the dangers associated with the shipment of certain types of bulk cargoes;
- (2) giving guidance on the procedures to be adopted when the shipment of bulk cargoes is contemplated;
- (3) listing typical materials currently shipped in bulk, together with advice on their properties, handling etc.; and
- (4) describing test procedures to be employed to determine various characteristics of the materials to be carried.

The list of solid bulk cargoes appearing in the BC Code is by no means exhaustive, and the physical or chemical properties attributed to them are intended only for guidance. Therefore, before loading any bulk cargo it is essential to obtain information on the physical and chemical properties of the cargo. The master has to be provided with loading information sufficiently comprehensive to enable him to arrange the loading of his ship so as not to overstrain the structure and to calculate the stability of the ship for the worst conditions anticipated during the voyage.

Other information to assist persons responsible for the loading and unloading of solid bulk cargoes is contained in recommendations published by the Organization. The MSC of the IMO has developed a form for cargo information advice on duties of chief mates and officers of the watch at loading and discharging ports, a cargo operations form and advice on safe practices on board bulk carriers. The BC code also lists certain general precautions. Currently, the practices contained in the BC Code are intended as recommendations to governments, ship operators and masters, and bring the attention of those concerned to internationally accepted methods of dealing with hazards which may be encountered when carrying a cargo in bulk; the BC Code is expected to become mandatory by 2011.

V. The International Grain Code

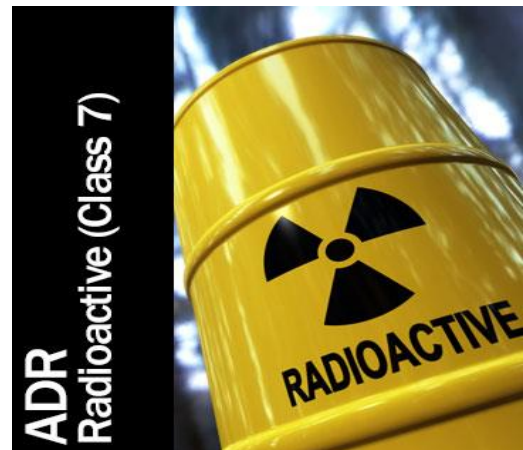
Originally grain was transported in sacks, but by the middle of the 20th century the normal procedure was to carry it in bulk. It could be stored, loaded and unloaded easily and the time taken to deliver it from producer to customer was greatly reduced, as were the costs involved. However, grain has one great hazard when carried in bulk. It tends to shift within the cargo space of the ship. Because of this danger and the great amount of grain transported by sea, special rules governing its carriage in bulk have appeared in various international instruments. Grain has a tendency to settle during the course of the voyage, as air is forced out when the individual grains sink ("sinkage"). This leads to a gap developing between the top of the cargo and the hatch cover. This in turn enables the cargo to move from side to side as the ship rolls and pitches. This movement causes the ship to list and, although initially the ship's movement will tend to right this, the list can eventually become more severe. In worst cases, the ship can capsize. This problem was well known and when the IMO came into being, one of its first tasks was to consider new measures for improving the safety of bulk carriers. These were incorporated into SOLAS 1960. However, new regulations had some deficiencies as far as safety was concerned, for during a period of four years, six ships loaded under the 1960 rules were lost at sea.

The IMO began looking at this problem early in 1963 and asked masters of ships to contribute information to a broad study. Further studies and tests showed that some of the principles on which the 1960 regulations were based were invalid; in particular, it was shown that the 1960 Convention had underestimated the amount of sinkage. As a result, the IMO Assembly in 1969 adopted new grain regulations in Resolution A.184 (VI), which became generally known as the 1969 Equivalent Grain Regulations. Voyage experience over a three-year period showed that the 1969 Grain Equivalents were not only safer but were also more practical and economical than the 1960 regulations and, being based upon operational experience, they were used as the basis for new international requirements which were subsequently incorporated into the SOLAS Convention. The International Code for the Safe Carriage of Grain is designed to prevent the particular qualities of grain threatening the stability of ships when carried in bulk. Part A contains special requirements and gives guidance on the stowage of grain and the use of grain fittings. Part B deals with the calculation of heeling moments and general assumptions. Part C of the revised SOLAS Chapter VI, Regulation 9 stipulates the requirements for cargo ships carrying grain.

VI. The radioactive materials regulations

Millions of radioactive materials are sent around the world each year. Each shipment consists of either a single package or a number of packages sent from one location to another at the same time. Some shipments are made for the nuclear fuel cycle industry, but the vast majority of shipments are for medical, agricultural and industrial use. All transport modes are used. The shipments range from small quantities of radioactive substances for hospitals, which may go through the ordinary postal system, to flasks of highly radioactive spent fuel from nuclear power stations, which travel mainly by rail, ships or road. The transport of radioactive materials has a long history dating back several decades before the advent of nuclear power. Over the years, a comprehensive and stringent regulatory framework has been developed at both international and national levels to ensure safety.

The International Atomic Energy Agency (IAEA), a UN body, was established as an autonomous organization in 1957. The IAEA serves as an intergovernmental forum for scientific and technical co-operation in the peaceful application of nuclear technology, provides international safeguards against its misuse and facilitates the application of safety measures in its use. In 1961, the IAEA published advisory regulations for the safe transport of radioactive materials. The Regulations for the Safe Transport of Radioactive Materials have become recognized throughout the world. The Regulations have been regularly reviewed since their publication to reflect the changes in requirements to the basic safety principles; to protect the general public and the environment; to reflect technological advances; and to reflect lessons learned from regulatory and operational experience. The latest version of the Regulations was published in 1996 and entered into force on 1 January 2002. The IMDG Code includes IAEA standards for Class 7 radioactive materials. The transport of radioactive materials has an outstanding safety record. Indeed, in terms of its safety record and the strict liability imposed by the international system of regulation under which it operates, the transport of nuclear materials could be regarded as a model for the transport of other classes of dangerous goods.



Picture 2.4.2 Radioactive material

2.5 THE HNS CONVENTION

The **HNS Convention** (Hazardous and Noxious Substances by Sea Convention) is an international convention created in 1996 to compensate for damages caused by spillage of hazardous and noxious substances during maritime transportation. The convention is officially known as the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996. The convention has not entered into force due to signatory states not meeting the ratification requirements. Canada, France, Germany, Greece, the Netherlands, Norway, and Turkey signed the 2010 protocol to the convention.

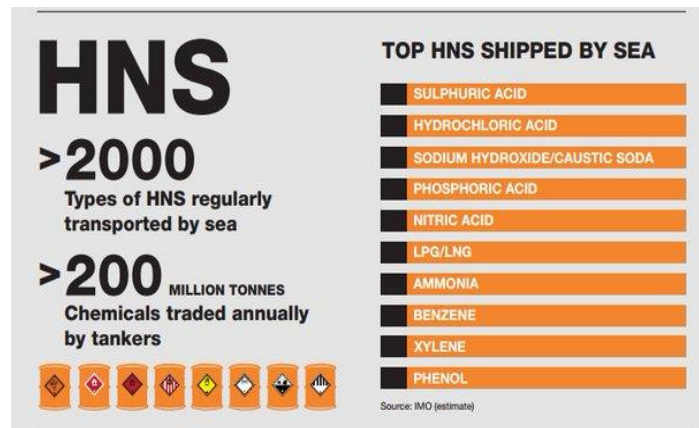
An HNS is a substance such as chemicals, which could threaten humans and marine life and interfere with legitimate uses of the sea, if spilled in the sea. HNS is considered dangerous goods. Under the convention, it does not include crude oil. Whether a substance is hazardous or noxious is determined by its inclusion in the number of conventions and codes of the International Maritime Organization developed to protect maritime safety and environment. For example, the substances listed under International Maritime Dangerous Goods Code are considered HNS.

On 3 May 1996 the IMO adopted the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention 1996) which has not yet entered into force. It will enter into force 18 months after at least 12 States, including 4 with a minimum gross tonnage of 2 million tons, have expressed their consent and if the persons in these states contributing to the future HNS Fund had received at least 40 million tons of relevant substances in the preceding year. The Council, by Decision of 18 November 2002, decided to authorize the Member States to ratify or accede to the HNS Convention in the interest of the Community.

The Convention creates a system of strict liability of the ship owner for damages caused by the carriage of hazardous and noxious substances by sea up to certain limits depending on the tonnage of the ship and covered by compulsory insurance. The maximum amount available under this first tier is 100 million SDR (Special Drawing Rights is the International Monetary Fund's currency). In addition to that a compensation fund (HNS Fund) will provide compensation in cases where full compensation is not available under the first tier. This may be the case if no liability of the ship owner arises (e.g. act of war), if the ship owner is financially incapable to meet all obligations or if his liability limits are exceeded. The total maximum compensation is of 250 million SDR per incident. The fund will be financed by receivers of HNS substances transported by sea in the Member States in excess of certain thresholds.

Hazardous and noxious substances are defined, for the purpose of the convention, as following:

- Oils, as defined in regulation 1 of annex I to MARPOL 73/78 (carried in bulk)
- Noxious liquid substances, as defined in regulation 1.10 of Annex II MARPOL 73/78. Additionally, those substances provisionally categorized as pollution category X, Y or Z and listed in MEPC 2 Circulars for substances subject to tripartite agreements (carried in bulk)
- Dangerous liquid substances listed in chapter 17 of the IBC Code (carried in bulk)
- Dangerous, hazardous and harmful substances, materials and articles covered by the IMDG Code, in effect in 1996 (carried in packaged form)



Picture 2.5.1 HNS materials shipped by sea

- Liquefied gases as listed in chapter 19 of the IGC Code
- Liquid substances with a Flash Point not exceeding 60°C (carried in bulk)
- Solid bulk materials possessing chemical hazards covered by the IMSBC Code. These substances are also subject to the provisions of the IMDG Code in effect in 1996 (carried in packaged form)

An overview of the HNS Convention has been prepared by the IMO Correspondence Group and approved by the IMO Legal Committee in April 2002. The Secretariat of the IOPCF prepared a Guide to the Implementation of the HNS Convention and a system to monitor contributing cargo under the HNS Convention, which includes a database of all substances qualifying as hazardous or noxious substances (HNS): HNS Finder and Calculator.

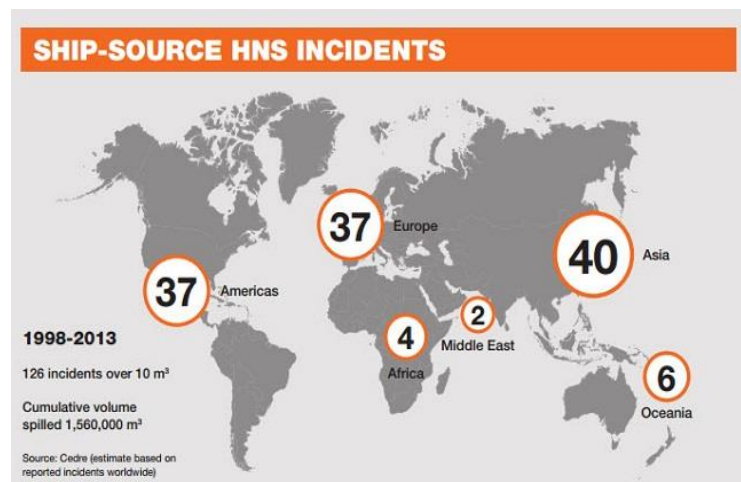
Due to the problems with the ratifications of the HNS Convention 1996 and reports on the contributing cargo, a

Protocol amending the Convention was adopted by the IMO Diplomatic Conference in April 2012. The Protocol introduced certain changes to the following issues:

- Liability for carriage of HNS in a package form
- contributions to the LNG Account
- the concept of "receiver"
- the non-submission of contributing cargo reports on ratification of the Convention and annually thereafter.

Types of damages covered by the convention:

- Loss of life or personal injury
- Loss of or damage to property outside the ship
- loss or damage caused by contamination of the environment
- Costs of preventive measures



Picture 2.5.2 HNS incidents all over the world until 2013

3. IMDG CODE CLASSES

3.1 ANALYSIS OF IMDG CLASSES

Class 1: Explosives

These are among the most dangerous of all goods carried by sea and the precautions outlined in this class of the Code are particularly stringent. The class is divided into six divisions which present different hazards.

– Division 1.1: substances and articles which have a mass explosion hazard. A mass explosion is one which affects almost the entire load virtually instantaneously.

– Division 1.2: substances and articles which have a projection hazard but not a mass explosion hazard.

– Division 1.3: substances and articles which have a fire hazard and either a minor blast hazard or minor projection hazard or both, but not a mass explosion hazard

– Division 1.4: substances and articles which present no significant hazard. This division comprises substances which present only a small hazard in the event of ignition during transport. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire need not cause virtually instantaneous explosion of almost the entire contents of the package.

– Division 1.5: very insensitive substances which have a mass explosion hazard. This division comprises substances which have a mass explosion hazard but are so insensitive that there is very little probability of transition from burning to detonation under normal conditions of transport.

– Division 1.6: extremely insensitive articles which do not have a mass explosion hazard.

Class 1 is unique in that the type of packaging and method of packing used frequently has a decisive effect on the hazard and, therefore, on the assignment of an explosive to a particular division and compatibility group. Although the safety of goods in Class 1 can be best assured by stowing them separately, this can rarely be done in practice. To ensure that they are stowed as safely as possible, the goods in the class are arranged in twelve compatibility groups.

Class 2 – Gases

Gases carried on board ships have various chemical properties and come in different states. They may be compressed, liquefied at ambient temperature under high pressure, dissolved under pressure in a solvent, which is then absorbed in a porous material, or liquefied by refrigeration. They may, for example, be non-flammable, non-poisonous, flammable, poisonous and corrosive, support combustion or be a combination of all or some of these. Some gases are lighter than air, while some are heavier. For the purpose of stowage and segregation, Class 2 is divided into 3 subclasses according to the hazards presented by the gases during transport.



Picture 3.1.1 Explosion on container vessel



Picture 3.1.2 Liquefied Natural Gas carrier

- Class 2.1: flammable gases
- Class 2.2: non-flammable, non-poisonous gases
- Class 2.3: poisonous gases

Class 3 – Flammable liquids

This class deals with liquids which give off flammable (ignitable) vapours at or below 61°C closed cup (c.c). This is called flash-point. Some flammable liquids are included in other classes because of their other more predominant poisonous or corrosive properties.

Class 3 is divided into three subclasses according to the flashpoints of the liquids:

- Class 3.1 covers liquids with a low flashpoint (below -18°C c.c. (0°F), such as acetone;
- Class 3.2. covers liquids with an intermediate flashpoint (-18°C up to but not including 23°C c.c. (73°F), such as benzene; and
- Class 3.3. covers liquids with a high flashpoint (23°C and above up to 61°C c.c. (141°F), such as certain alcoholic beverages. Generally speaking, water is unsuitable in fighting a fire involving flammable liquids.



Picture 3.1.3 Container carrying flammable liquids

Class 4 – Flammable solids or substances

This class is divided into three subclasses which have very different properties. The class includes some commonly known products, many of which seem harmless enough but which can be very dangerous unless properly packed, handled and transported.

▪ Class 4.1 – Flammable solids

The substances and materials in this class are solids possessing the properties of being easily ignited by external sources, such as sparks and flames, and of being readily combustible or being liable to cause or contribute to fire through friction. This class also covers substances which are self-reactive, i.e. liable to undergo at normal or elevated temperatures a strong exothermic decomposition caused by excessively high transport temperatures or by contamination, and desensitized explosives, which may explode if not diluted sufficiently. Under certain conditions, an explosives subsidiary risk label is required for some substances. This class comprises:

- Readily combustible solids and solids which may cause fire through friction;
- Self-reactive (solids and liquids) and related substances; and
- Desensitized explosives

Some common products covered by this class are celluloid; camphor; dry vegetable fibers such as cotton, flax, jute, hemp, kapok; some metal powders; naphthalene; sisal; hay and straw; matches; rubber scrap and sculpture.

▪ Class 4.2 – Substances liable to spontaneous combustion

Substances in this class are liable to become warm and to ignite spontaneously. Some are more likely to do so when wetted with water or in contact with moist air. Some may also give off toxic gases if involved in a fire. Because of these properties, packing and stowage requirements are important. Although some general information is contained in the introduction to the class, more detailed information is given in the individual schedules. Common products included in this class are



Picture 3.1.4 Flammable solids sign

charcoal, celluloid scrap, copra, wet or damp or oily fibers, some nitrocellulose-based plastics, fishmeal and seed cakes.

▪ *Class 4.3 – Substances which, in contact with water, emit flammable gases.*

Since the substances in this class give off gases which are sometimes subject to spontaneous ignition and are also toxic, fire-fighting is a particular problem. The use of water, steam or water-foam extinguishers may make matters worse and even the use of carbon dioxide can do more harm than good in some situations; for small fires, neutralizing powders or sand is recommended. Common products in this class include calcium carbide, metal powders, ferrosilicon, magnesium and magnesium-based products, potassium and potassium based products, rubidium and sodium.



Picture 3.1.5 Dangerous when wet sign

Class 5 – Oxidizing substances

This class is divided into two subclasses. Class 5.1 deals with oxidizing substances which, although not necessarily combustible in themselves, may increase the risk and intensity of a fire by giving off oxygen. Class 5.2 covers organic peroxides, most of which are combustible.

○ *Class 5.1 – Oxidizing substances (agents)*

The fact that all substances in this class give off oxygen when involved in fire creates obvious fire-fighting difficulties, even though they are not necessarily combustible themselves. Some substances may also be sensitive to impact, friction or a rise in temperature, and some may react vigorously with moisture, so increasing the risk of fire.

Mixtures of these substances with organic and combustible materials are easily ignited and may burn with explosive force. There will also be a violent reaction between most oxidizing substances and strong liquid acids, producing highly toxic gases. One fire-fighting problem is caused by the fact that some substances in this class give off oxygen when involved in a fire, so that the use of steam, carbon dioxide or other inert gas extinguishers may be ineffective. This class includes ammonium nitrate fertilizers, chlorates, chlorites, and calcium and potassium permanganates.

○ *Class 5.2 – Organic peroxides*

In addition to being oxidizing substances (agents), most substances in this class are liable to violent or explosive decomposition. Most will burn rapidly and are sensitive to heat. Some are also sensitive to impact or friction. To reduce this sensitivity to a safe level, they are carried in a solution, such as a paste, wetted with water or with an inert solid. Even so, some may react dangerously with other substances. Some organic peroxides can be particularly dangerous to the eyes, even after only momentary contact, and immediate rinsing of the eyes lasting at least 10 to 15 minutes is essential, followed by medical attention. Some substances may begin to decompose when a certain temperature is exceeded, and in some cases this may lead to an explosion. To prevent this, some organic peroxides have to be transported at a controlled temperature. Fire is another problem and may result in explosion. Packages containing organic peroxides should be moved away from the heat of any fire or jettisoned. Organic peroxides are carried by sea “on deck only” and are prohibited for carriage on most passenger ships.



Picture 3.1.6 Oxidizer and Organic Peroxide signs

Class 6 – Toxic and infections substances

Class 6 is subdivided into two classes.

- *Class 6.1 – Toxic substances*

Substances in Class 6.1 may cause serious injury or even death if swallowed, inhaled or absorbed by contact through the skin. They are arranged in three pack-ing groups (I, II and III) in descending order of risk. Fire-fighting measures are basically the same as those given for Class 3, flammable liquids, but because of the high risk of poisoning through fumes, the IMDG Code provides that ships carrying poisonous substances should always carry protective clothing and self-contained breathing apparatus. If leakage or spillage involving toxic substances occurs, decontamination should be carried out by trained staff wearing protective clothing and equipment. This class covers mainly pesticides and insecticides, but also substances such as chloroform, cyanides, strychnine and tear gas.

- *Class 6.2 – Infectious substances*

These are substances containing viable micro-organisms, including bacterium, virus, rickettsia, parasite, fungus or a recombinant, hybrid or mutant that are known or reasonably believed to cause disease in animals or humans. However, they are not subject to the provisions of this class if the spread of disease to humans or animals exposed to such substances is considered unlikely. Infectious substances carry a special label. In the case of damage or leakage, public health authorities have to be notified immediately.

Class 7 – Radioactive materials

The provisions of this class are based on the principles of the IAEA's Regulations for the Safe Transport of Radioactive Materials. They offer guidance to those involved in the handling and transport of radioactive materials in ports and on ships without necessarily consulting the IAEA safety regulations, although references to the IAEA Regulations have been included in the Class 7 IMDG Code. Packing, labelling and placarding, stowage, segregation and other requirements vary according to the radioactivity of the material. Radioactive materials are divided into three categories, depending on radiation levels, Category I being the least dangerous.

Class 8 – Corrosives

Substances in this class are solids or liquids; they can damage living tissue and materials, in some cases very severely. Some of them give off irritating, poisonous or harmful vapours and some are flammable or give off flammable gases under certain conditions. Substances in this class may be corrosive to metals such as aluminium, zinc and tin but not to iron or steel, while others are corrosive to all metals. Some substances even corrode glass. Water can also affect some substances by making them more corrosive, by liberating gases and, in a few cases, by generating heat. Due to these different properties, packing, stowage and segregation are extremely important. The substances are also divided into three packaging groups, packaging Group 1 being the most dangerous. The introduction to Class 8 gives detailed information on the types of packaging to be used. Most fires involving corrosive substances can be dealt with by any extinguishing agent, including water, although those which are also flammable should be dealt with in the same way as substances in Class 3 of the IMDG Code. Care must also be taken in view of the high risk of poisoning through fumes. This class includes battery acid, formic acid, caustic soda and sulphuric acid.



Picture 3.1.7 Corrosion by the carriage of corrosive materials

Class 9-Miscellaneous

This class includes substances, materials and articles which, for various reasons, do not come within any of the other classes. As their properties and characteristics are so varied, the individual schedules usually include detailed information on stowage and segregation, packing and further observation.

Marine pollutants

Marine pollutants are substances which, because of their potential to accumulate in seafood or because of their high toxicity to aquatic life, are subject to the provisions of Annex III of MARPOL 73/78. Marine pollutants are not a separate class, although they are regulated under a special title. Many of the substances in Class 1 to 9 are, in fact, considered to be marine pollutants.

3.2 CAUSES OF INCIDENTS

It is not usually the product itself but the failure to comply with the IMDG Code that causes incidents. Calcium hypochlorite has a known history of causing serious incidents on board ships but is by no means the only cargo which has an unenviable reputation. The following factors contribute, either individually or in combination to cause incidents:

- Mis-declaration or non-declaration by shippers
- Quality and selection of packaging
- Provision and accuracy of documentation and labelling
- Professionalism of the container packing process
- Human factors – regional, cultural and company attitudes to good practice and compliance
- Unchecked irregularities in the product production process
- Mis-handling or dropping containers

A shipper may mis-declare dangerous goods either as a deliberate attempt to deceive or out of ignorance. An intentional mis-declaration by way of describing the cargo as a product which would ordinarily be considered harmless may be made to avoid additional freight charges or the more strict carriage requirements prescribed in the IMDG Code.

Analysis of data captured by CINS over the period 2013- 2014 indicates that 27% of incidents in terms of detected causation were attributable to cargo being mis-declared, second only to poor packaging (CINS membership includes almost 70% of the global container slot capacity).

The failure of shippers to properly declare dangerous goods is a continuing challenge for ship owners and has been a significant contributory factor in a number of high profile shipping casualties involving loss of life and severe structural damage, not to mention numerous lower intensity incidents and near misses. Worryingly, the IG Clubs have in recent years observed an apparent increase in container fires involving calcium hypochlorite which, in the majority of cases was found by investigation to have been mis- declared by shippers.

4. THE DUTIES OF THE PARTIES

4.1 DUTIES OF THE SHIPPER

In general, a shipper will be liable for the payment of freight charges, as well as demurrage in some cases. In addition, certain clauses deal with the allocation of responsibility for those parts of the contractual performance which require joint actions from both carrier and shipper, such as loading, stowage and delivery of the goods. Apart from these responsibilities, the shipper is allocated certain obligations which are either in his exclusive sphere of influence and necessary prerequisites to the contractual performance by the carrier or are based on the special knowledge of the shipper.

Dangerous goods must be properly classified, packed, marked and labelled and handled in accordance with the regulations. It is to be noted that Hamburg Rules requires the shipper must mark or label in a suitable manner dangerous goods dangerous. However, notwithstanding the requirements for notification and packaging, it is a fact that many consignments of dangerous chemicals are shipped, particularly in freight containers, without the appropriate labelling, packaging and notification. Here a distinction is necessary between bulk and packaged dangerous cargoes.

The physical characteristics of bulk cargoes are unique and differ from that of packaged goods. In terms of quantity dangerous goods in bulk have greater potential to cause more damage than those which are packed. However as they are not packaged, there is no element of concealment. Moreover, there is no need, nor it is practical, for bulk dangerous goods to be marked and labelled. Therefore, below explanations will be mostly regarding packaged dangerous goods which in practice cause more troubles.

I. Classification of dangerous goods

When it is agreed that dangerous goods are to be carried, the first step is to determine the class of the goods, so that all necessary measures can be taken as required. The classification must principally be made by the shipper in accordance with the IMDG Code. As mentioned previously, if the substance is not specifically listed in the extensive Dangerous Goods List (DGL), this does not mean that it is not dangerous. It is the onus of the shipper to determine the class of the substances according to provided criteria.

II. Packing of dangerous goods

1. Purpose of packing

Traditionally dangerous cargoes are carried in packaged form for easy identification, durability and easy and safe recovery in case of incidents. Packing is the assembly of items into a unit, intermediate or exterior pack with necessary blocking, bracing, cushioning, weatherproofing, reinforcement and marking. The transport of dangerous goods is associated with special risks because of the property of the transported substances, i.e. that of being dangerous. The packing has an extremely important role with respect to minimizing such risks. Packing emphasizes on: protection and handling. Packing should protect the contents in such a way that neither their performance nor their reliability is affected by:

- outside mechanical forces such as impact or vibration
- contamination of undesirable substances, e.g. water or air
- climatic conditions, e.g. heat or cold. And should facilitate:
 - transport and storage of the product
 - opening and remaining opened when needed
 - closing and remaining closed when needed
 - removal of content from the packing
 - complete emptying of the packing

2. Packing obligation

The Hague/Hague-Visby Rules contain no provision imposing a duty on the shipper to pack sufficiently, but instead relieves the carrier from liability. It is historically one of the earliest contractual defenses available to carriers and is still among the most important exculpatory exceptions to be found in the Hague/ Hague-Visby Rules which provides that “*Neither the carrier nor the ship shall be responsible for loss or damage arising or resulting from insufficiency of packing.*” Insufficiency of packing is a development of the “inherent vice” exception to packing, which of course is not inherent.

However, the duty of the shipper to pack properly is a natural part of his duties and the specific requirements as to packing can be found as part of the statutory or contractual obligations of the shipper. In practice, unless otherwise agreed by parties in the contract of carriage, goods are packed by shippers. Potential liabilities of the shipper often involve defects in the packages. Although in most cases the shipper does not pack the goods himself, it is his duty to ensure sufficiency of packing under the carriage contract. Failure to do so amounts to his fault and he is responsible for the consequences.

3. Sufficiency of packing

Sufficient packing is normal or customary packing in the trade. Such packing should permit the goods to withstand the normal hazards likely to be encountered on the specific voyage contemplated and to prevent all but the most minor damage under normal conditions of care and carriage. There is no single criterion for insufficiency of packing. Each case must be considered in its own facts. The degree of packing required and the care to be taken relate to the cargo to be carried. Some cargoes require a higher degree of care and packing in a certain way, as in the case of dangerous goods in packaged form. In each instance, the degree of care that can reasonably be expected of the shipper and the degree of care that can reasonably be required from the carrier must be well balanced.

Dangerous cargoes are packed either by the shipper himself or by a third-party packer. Whoever performs it, packing is very important task. He is responsible for following the comprehensive and relatively complex legislation which must be observed in preparing dangerous goods for transportation. The importance of the packer’s role is apparent when his key responsibilities are examined: packages must be suitable; containers and other packaging must be in a good condition and appropriate for the goods; packing must be in accordance with regulations, and with new technology. Packing is the most important aspect of the handling of dangerous goods. It is generally believed that if the packing is suitable, the risk of a serious incident occurring is greatly reduced. The packing of dangerous goods plays a significant role in protecting other cargo, the ship and those onboard. The case law dealing with packing defects often involves dangerous goods that leak or escape from a defective container, drum or otherwise.

Dangerous goods must be packed in good quality packagings which shall be strong enough to withstand the shocks and loadings normally encountered during transport. Packagings must be constructed and closed so as to prevent any loss of contents when prepared for transport which may be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure and must be closed in accordance with the information provided by the manufacturer. For packing purposes, substances other than those of classes 1, 2, 5.2, 6.2, 7 and self-reactive substances of class 4.1, are assigned to three packaging groups in accordance with the danger they present:

- Packing group I: substances presenting higher danger
- Packing group II: substances presenting medium danger
- Packing group III substances presenting low danger.



Picture 4.1.1 Packing of dangerous goods

III. Stowage and segregation of dangerous goods

Stowing and lashing the cargo are part of the operation of loading. It refers to the placing of the goods in a ship's spot or a container. In the absence of an express contract or custom, stowage is the duty of the carrier through the master. In other words, if there is an express contract or custom, stowage is done by the shipper. The final responsibility for proper stowage, however, remains in all circumstances with the carrier. Questions of stowage are under the absolute control of the master of the vessel and as such he has the final say as to how stowage is to be effected. Goods on board ships are subject to all sorts of stresses. Of particular significance are those imposed during handling, transfer between ship and shore and bad weather. Significant stresses also arise on shore. This means that poor stowage or securing of packages within the cargo transport unit is liable to cause serious problems both at sea and on land. The relative complexity of this transportation process manifests itself in the numerous guidance documents and regulations governing the process.

Chapter 7 of the IMDG Code contains detailed provisions regarding stowage and segregation of incompatible dangerous goods. Two substances or articles are considered mutually incompatible when their stowage together may result in undue hazards in the case of leakage or spillage, or any other accident. The extent of the hazard arising from possible reactions between incompatible dangerous goods may vary and so may the segregation. Such segregation is obtained by maintaining certain distances between incompatible goods or by requiring the presence of one or more steel bulkheads or decks between them, or a combination thereof. For the purpose of segregation, dangerous goods having certain similar chemical properties have been grouped together in segregation groups. Whenever dangerous goods are stowed together, the segregation of such dangerous goods from others must be done in accordance with the most stringent provisions for any of the dangerous goods concerned.

When the shipper packs the container, he should do so properly. It is admitted that the carrier's due diligence obligation does not require him to inspect the inside of the container. While the carrier has the authority to open any container once it is on board, the practice of carriers is to leave containers sealed unless a specific reason to open them arises. The carrier has no obligation to open the container, inspect it and inform the shipper how to stow the said cargo. However, some carriers adopt a system of randomly inspecting the contents of containers listed as carrying the IMDG cargo. Generally, containers are sealed and the purpose of sealing them is to ensure the integrity of their contents. It is practice and desirable in shipping that the seal be intact upon arrival at the port of destination. Moreover, it is almost impossible to inspect every sealed container. Consequently, improper stowage of cargo in containers by the shipper, who stuffs and seals the containers, is the responsibility of the shipper. Bulk cargoes also be loaded and trimmed properly and in accordance with the regulations.

IV. Marking of dangerous goods

In practice, it is the shipper who supplies the details that are written on the bill of lading. Thus, the bill of lading terms usually require the shipper to mark and describe the cargo accurately, to guarantee the accuracy of any such description and to undertake to indemnify the carrier against losses and third-party liability arising from inaccurate descriptions and markings. These obligations are of particular relevance with respect to the receipt function of the bill of lading and the carrier's liability for the goods shipped as described on the bill of lading.

The Hague/Hague-Visby Rules require the shipper to mark the goods and indicate the leading marks necessary for identification of the goods if the shipper wants the carrier to issue a bill of lading in accordance with Art. III.3. The bill will be prima facie or conclusive evidence of the shipment in good order or condition of the indicated quantity of goods, identified by leading marks. According to Art. III.5 "the shipper shall be deemed to have guaranteed to the carrier the accuracy of the marks, number, quantity and weight, as furnished by him and shall indemnify the carrier against all loss, damages and expenses arising or resulting from inaccuracies in such particulars". The obligation of

the shipper to mark and describe the goods accurately is of central importance, as the liability of the carrier will relate to goods the particulars of which will have been furnished by the shipper. The shipper is liable for inaccurate particulars furnished by him, irrespective of fault. This rule gives the carrier a right of action for indemnity for any loss he suffers as a result of inaccuracy in the particulars contained in bills of lading derived from the shipment of the goods in respect of marks, quantity and weight, though not apparently as to the *nature* of the goods themselves, nor as to in practice, clauses requiring the shipper to mark the goods in a certain manner are relatively rare. This may be due to the fact that a clause that imposes more extensive obligations on the shipper, thus limiting the carrier's liability beyond the exceptions to the Hague/Hague-Visby Rules, would be void under Art. III.8. However, the shipper is under statutory duty to mark dangerous goods in a certain manner and this is generally contained in the bills of lading.

V. Marking, labelling and placarding in accordance with IMDG Code

The purpose of marking and labelling dangerous goods, in general, is to inform related persons about the contents of packages to allow them to handle the goods appropriately for safety and health purposes and to ensure that the substances can be readily identifiable during the transport. This is particularly important in the case of an accident involving these goods, in order to determine what emergency procedures are necessary to deal properly with the situation and, in the case of marine pollutants, for the master to comply with the reporting requirements of MARPOL 73/78.

In that respect marking and labelling serve the same objective as the documentation. However, marking and labelling give more clear and immediate notice of dangerous characteristics of the goods in proximity with the packages who may not be aware of the same by virtue of the dangerous goods documentation.

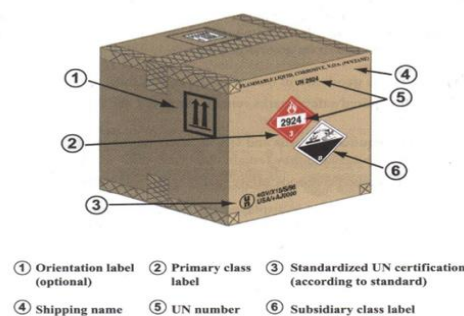
Chapter 5 of the IMDG Code contains detailed provisions concerning marking and labelling. By means of a symbol, the nature of the risk can be indicated to all concerned; no matter what language they speak. Differently coloured labels make it easier to distinguish the goods, thus providing a very useful guide for handling and storing operations. And by their general appearance they are easily recognizable from a distance as indicating dangerous goods.

For marking in accordance with the IMDG Code, the Proper Shipping Name and the corresponding UN Number, preceded by the letters "UN", shall be displayed on each package. All marking on packages must be:

- readily visible and legible. For instance, in order to allow identification– such that this information will still be identifiable on packages surviving at least three month's immersion in the sea.
- displayed on a background of contrasting colour on the external surface of the package and
- must not be located with other package marking that could substantially reduce their effectiveness.

Enlarged labels (placards) will be affixed on cargo transport units to provide a warning that the contents of the unit are dangerous goods and present risks, unless the labels and/or marks affixed to the packages are clearly visible from the exterior of the cargo.

The shipper should correctly and conspicuously mark and label dangerous goods, since this will be part of his duty to give notice of dangerous cargo. If the shipper falsely, incorrectly or recklessly labels or describes goods, his liability is unavoidable.



Picture 4.1.2 Marking and labelling of dangerous goods

4.2 THE DUTIES OF THE CARRIER

The safe carriage of dangerous goods cannot be attained if duties were imposed only on the cargo interests. Some of the requirements of the IMDG Code and other codes must be observed by the carrier and his employees. In fact, the duties of shipper and carrier are interrelated. There are some duties which are exclusively imposed on the carrier as well as duties which serve as a back-up mechanism.

I. Seaworthiness of the ship

In common law, the provision of a seaworthy vessel by the carrier at the beginning of the voyage was implied in every contract to ship goods by water. This warranty was absolute and was not dependent on a finding of knowledge or negligent conduct. That means the ship owner is liable in common law for failure to make the ship seaworthy in fact, although he may have taken all reasonable pains and precautions to do so.

However, the Hague-Visby Rules modified common law by reducing the obligation to use due diligence. Accordingly, the Hague/Hague-Visby Rules Art. III.1 set out. The carrier shall be bound before and at the beginning of the voyage to exercise due diligence to:

- (a) make the ship seaworthy
- (b) properly man, equip, and supply the ship
- (c) make the holds, refrigerating and cooling chambers and all other parts of the ship in which goods are carried fit and safe for their reception, carriage and preservation.

This article is paired with Art. IV.1, which provides that neither the carrier nor the ship shall be liable for loss or damage arising or resulting from unseaworthiness unless caused by want of due diligence on the part of carrier to make the ship seaworthy, and to secure that the ship is properly manned, equipped and supplied, and to make the holds refrigerating and cool chambers, and all other parts of the ship in which goods are carried fit and safe for their reception, carriage and preservation in accordance with the provisions of 1 of Art. III.

Seaworthiness means the ship is fit in design, structure, condition, manning and equipment to encounter the ordinary perils of the voyage. She must also have a competent master, and a competent and sufficient crew. The carrier must per-form *due diligence* to make the ship seaworthy, i.e. a genuine, competent and reasonable effort to fulfil his obligations. Due diligence is equivalent to reasonable diligence, having regard to the circumstances known, or fairly to be expected, and to the nature of voyage and the cargo to be carried.¹⁴⁸ It will suffice to satisfy the condition if such diligence has been exercised at the loading port. The fitness of the ship at that time must be considered with reference to the cargo and to the intended course of the voyage. Obviously a test of seaworthiness can be applied only on a case-by-case basis, considering the particular and relevant facts of the situation at hand.

The duty to provide a seaworthy ship at the beginning of the voyage is often delegated to the master, the crew or some other agent. However, this duty is non delegable and the carrier is accordingly responsible for the acts of any agent or shipyards he uses to fulfil this duty. When the carrier agrees to carry dangerous cargo, depending on the type of the dangerous cargo, the vessel must be constructed and equipped in accordance with all applicable regulations for the particular cargo. The vessel must be cleaned out after the former voyage and be ready for the said cargo. Dangerous cargo must be segregated and stowed in accordance with the regulations. If necessary, crew must be trained for dangerous cargoes.

II. Care of goods

Art. III (2) of the Hague/Hague-Visby Rules provides that "... the carrier shall properly and carefully load, handle stow, carry, keep, care for, and discharge the goods carried." The carrier is to see that the cargo is loaded safely and loaded without delay. The carrier; through his master; is obliged to be careful and skillful in stowing and protecting each part of the cargo. All reasonable precautions ought to be taken, by pumping, ventilation and so forth, to prevent the goods being damaged either through the action of causes external to them or by their own infirmities. Where damage has happened, all measures which are reasonably available, under the circumstances, ought to be taken to arrest or check the further destruction or deterioration of the goods.

Like the duty of seaworthiness, the duty of caring for the cargo is non-delegable and the carrier is accordingly responsible for the acts of the master, the crew, the stevedore and his other agents. However, unlike the duty of seaworthiness, which applies only before and at the commencement of the voyage, the duty of caring for the cargo applies during the voyage as well. Therefore, the carrier is responsible for the acts of the master and crew while the vessel is underway. Again, if the carrier agrees to carry dangerous cargo, he has a duty to exercise a much higher degree of care in loading, stowing and caring for those materials.

III. Stowage and segregation by the carrier

The carrier's duty to properly and carefully load, handle, stow, carry and keep the cargo is a stringent obligation though not an absolute one. Particularly, the word "properly" enunciates a very high standard of care. The final responsibility for proper stowage remains in all circumstances with the carrier, even if there is a Free In/Free out (F.I.O) expression in the contract. Questions of stowage are under the absolute control of the master of the vessel and as such he has the final say as to how stowage is to be affected. This is not only because of the carrier's responsibility for the stability of the ship and the safety of the ship and crew, but also because of the carrier's obligation to care for other cargo.

The carrier is expected to be an expert with respect to ordinary cargo and should stow it properly without having to receive special instructions. However, he cannot be expected to be an expert with regard to cargo which requires special care. The shipper should give the carrier instructions for cargo requiring special care. With the information provided by the shipper, the carrier must stow the cargo in accordance with all applicable regulations. When performed by the carrier, stowage into containers must be done properly and carefully, with proper bracing, blocking and dunnage inside.

The stowage of cargo inside containers in such circumstances is part of the loading of the ship. Generally, improper stowage is an act or omission by the carrier, his agents or servants which implies negligence or want of care and skill in stowing cargo. For instance, stowage of cargo subject to spontaneous combustion at high temperatures without providing adequate ventilation is improper, as is stowage of grain without shifting boards. The IMDG Code's detailed provisions with regard to stowage and segregation must be strictly followed. The dangerous goods plan should ensure that only valid positions are utilized for dangerous goods when planning and loading. In order to protect dangerous goods from adverse weather and also from the impact of a collision, they must not be stowed in outboard stacks. Likewise, the dangerous goods plan must be duly filled in with information pertaining to the dangerous goods on board. This allows a quick and easy location of dangerous goods.

IV. Obtaining information on the goods

It is unrealistic to expect operators of container vessels to know or to acquire knowledge of the characteristics of the hazardous material cargo they are asked to carry. It is the shipper that knows the most about the cargo being shipped and, therefore, he should have the initial and higher obligation to provide the information relevant for any hazardous materials. However, the carrier's right to receive and obtain information about the cargo is implicit in Art.IV.6 of the Hague Rules. The carrier has the duty to use all reasonable means to ascertain the nature and characteristics of the goods tendered for shipment and to exercise due care in their handling. That is to say if he is informed of the particular cargo, then he is expected to ascertain the characteristics of it for him to properly handle it. For instance if the cargo is ore he should ascertain moisture content or if the cargo is coal specific type or the cargo or temperature if he is not provided any information on these issues by the shipper. The safe carriage of goods depends on the information available regarding the nature of the cargo and handling conditions.

V. Documentation, marking and labelling packaging

If there is due cause to suspect that dangerous goods are not packed, marked, labelled and documented in accordance with the regulations, the carrier should not take the goods on board. This duty of carrier is a back-up mechanism to ensure that the cargo interest has fulfilled his duties.

VI. Dangerous goods manifest

The carrier's initial responsibility is to make sure the shipper has provided the correct paperwork and to create his own records upon receipt of certification from the shipper concerning dangerous goods. The carrier, through the master, must prepare a dangerous goods list or manifest containing, among other information, the name, packaging and stowage location of each hazardous material carried aboard the vessel. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods and marine pollutants, may be used in place of such a special list or manifest. This dangerous goods or marine pollutants list or manifest shall be based on the documentation and certification required in the IMDG Code. When the manifests have been received on board, they must be carefully checked by comparing the information submitted with the IMDG Code and the vessel's dangerous goods cargo check-list.

**2015
DANGEROUS GOODS CHECKLIST FOR A NON-RADIOACTIVE SHIPMENT**

The recommended checklist appearing on the following pages is intended to verify shipments at origin. Never accept or refuse a shipment before all items have been checked. Is the following information correct for each entry?

SHIPPER'S DECLARATION FOR DANGEROUS GOODS (DDG)	YES	NO	N/A
1. Two copies in English and in the UTA format including the air certificate (wherever [3.1.1, 3.1.2, 3.1.6.1])	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Full name and address of Shipper and Consignee [3.1.3, 3.1.4.2]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. If the Air Waybill number is not shown, enter it [3.1.4.3]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The number of cargo items [3.1.4.4]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The non-proprietary hazard type entered or not shown [3.1.6.2]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. If full name of Agent on Ship or Destination is not shown, enter it [3.1.6.3 and 3.1.7]. Information is optional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The word "Radioactive" deleted or not shown [3.1.6.3]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identification			
8. UN or ID Number, preceded by prefix [3.1.8.1, Step 1]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Proper Shipping Name and the technical name in brackets for asterisked items [3.1.8.1, Step 2]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Class or Division, and for Class 1, the Compatibility Group, [3.1.8.1, Step 3]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Subsidiary Risk, in parentheses, immediately following Class or Division [3.1.8.1, Step 4]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Packing Group [3.1.8.1, Step 5]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quantity and Type of Packing			
13. Number and Type of Packages [3.1.8.2, Step 6]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Quantity and net or gross mass (net or gross followed by "G", as applicable) net in per package unit [3.1.8.2, Step 6]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. When other than dangerous goods are packed in one outer packaging, the following rules also apply with: -- Compliant according to Table 3.1.8.2 -- All packages meeting Division 6.2 [3.1.8.2, Step 7] -- All packed in one type of packaging [3.1.8.2, Step 8] -- Calculation of "G" value (net or gross) [3.1.8.2, Step 9]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Overpacks: -- Compliant according to Table 3.1.8.2, 3.1.8.2.1 -- Warning "Overpack" [3.1.8.2, Step 7] -- If more than one overpack is used, identification marks shown and total quantity of dangerous goods [3.1.8.2, Step 7]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Packing Instructions			
17. Packing Instruction Number [3.1.8.3, Step 8]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. For those packages in compliance with Section 6.2, "G" follows the packing instruction [3.1.8.3, Step 9]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Authorizations			
19. Copies of the latter special provisions, The Special Provision Number if A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A41, A42, A43, A44, A45, A46, A47, A48, A49, A50, A51, A52, A53, A54, A55, A56, A57, A58, A59, A60, A61, A62, A63, A64, A65, A66, A67, A68, A69, A70, A71, A72, A73, A74, A75, A76, A77, A78, A79, A80, A81, A82, A83, A84, A85, A86, A87, A88, A89, A90, A91, A92, A93, A94, A95, A96, A97, A98, A99, A100, A101, A102, A103, A104, A105, A106, A107, A108, A109, A110, A111, A112, A113, A114, A115, A116, A117, A118, A119, A120, A121, A122, A123, A124, A125, A126, A127, A128, A129, A130, A131, A132, A133, A134, A135, A136, A137, A138, A139, A140, A141, A142, A143, A144, A145, A146, A147, A148, A149, A150, A151, A152, A153, A154, A155, A156, A157, A158, A159, A160, A161, A162, A163, A164, A165, A166, A167, A168, A169, A170, A171, A172, 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type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Indicator that governmental authorization is attached, including a copy in English and additional approvals for other than one [3.1.8.4, Step 10]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional Handling Information			
21. The mandatory minimum shown for all aquatic and related substances of Division 6.1 and only chemicals of Division 6.2, or aquatic chemical, for PCB and for benzene [3.1.8.11, 3.1.8.11.2, 3.1.8.11.3 and 3.1.8.11.5]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Name and Transport Number or a responsible person for Division 6.2 (Infectious Substances) [3.1.8.11.6]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Name and Title (or Department) of Signatory, Place and Date indicated and Signature of Owner [3.1.8.11.7, 3.1.8.11.8 and 3.1.8.11.9]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Amendment or alteration signed by Shipper [3.1.2.4]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Picture 4.2.1 Dangerous goods check-list

The carrier's rights

As seen so far, the carrier's rights for compensation from the shipper differ according to whether the shipment of dangerous goods was performed with or without consent and knowledge as described before. The following account is founded on the assumption that the carrier has not materially broken his obligations under Article III of the Hague/Hague-Visby Rules.

I. Immunity

In common law, one of the exceptions to the strict liability of the carrier is "jettison". Where goods have been intentionally and properly destroyed during the course of a voyage, in order to save the ship and the remainder of the cargo from a danger which was common to the whole, the shipper is not answerable. Where the goods have been thus sacrificed, the law, except in certain cases, gives the owner a right to contribution towards his loss from those whose property was saved. But otherwise no claim for the goods or their value can be made against the carrier.

Based on this principle, irrespective of whether the carrier has consented to the carriage of the goods with knowledge of their nature and character, he has the right to "land, destroy or render the goods innocuous without compensation", i.e. in the sense of without paying compensation under Art.IV.6 of the Rules. The carrier's immunity extends to claims by any party to the bill of lading contract or in common law, a bailor on terms of the bill of lading and the charterer where appropriate. The master has authority to land, destroy or render innocuous at any time and any place and thus corresponds exactly to this wording of the Hague/Hague-Visby Rules. Whether the carrier or master has consented or not, neither the carrier nor the master is liable to pay compensation. Furthermore, it should be remembered that insofar as "fire" is involved, the carrier has the important and wide-ranging defense under Art.IV.2 (b) of the Hague/Hague-Visby Rules. It is to be noted that damage to or loss of goods caused by other reasons than exercising the right of landing, destroying or rendering the goods innocuous could amount to a distinct breach of the carrier's duties to care for goods under the Rules. Therefore, the carrier could not be exonerated from liability.

II. The exercise of the right of landing, destroying or rendering the goods innocuous

The rules governing the carrier's right to render innocuous dangerous cargo which threatens the means of transport or other interests on board are not always appended to the liability rules and may have a life of their own. Art. IV.6 of the Hague/Hague-Visby Rules gives the right to the carrier to land, destroy or render the goods innocuous. The powers of neutralizing the dangers are wide-ranging to cover every possible circumstance and therefore should not present any grounds for litigation. As the main concern underlying the right of disposal is the safety of life and property at sea, it has been asserted that, even where the carrier is in breach of his obligation as to the seaworthiness and care of the cargo, the carrier's right to land, destroy, or render the goods innocuous remains unimpaired. Such a right does not, however, exist when the cargo merely poses a risk of delay or detention to the ship, as it is considered that non-physical damage in the form of delay or detention is not covered by the Rules.

This right raises the question of whether the carrier is bound to act reasonably in exercising these rights. It is suggested that the carrier is so bound to both the choice between the various possible steps and to the carrying out of those steps. Accordingly, if it is possible to render innocuous the cargo, that should be tried first rather than destroying it. The steps taken by the carrier should be reasonably commensurate with the danger posed to the ship and adventure and with the requirements of preserving them, but on the other hand, the standard of reasonableness should be applied with some latitude to the carrier, bearing in mind that he will normally be faced with the need to decide upon his course of action as a matter of urgency and on the basis of incomplete information

1. Carrier has not consented to the shipment

The first paragraph, which applies when the carrier has not consented to the shipment, imposes no express limitation on the exercise of the rights. The carrier need not demonstrate that the goods have become a danger to ship and cargo. The reasoning is, presumably, that the carrier is not required to run a risk to which he never consented. But the absence of any express constraint makes it all the more necessary to imply some obligation, however limited, to act reasonably. Thus, if there is no reason why the goods should not be safely carried, it is contended that the carrier would not be justified in exercising his right under the first paragraph; on the other hand, if the carriage presents real risks, the carrier should not be required to wait until the danger is imminent before exercising his rights.

2. Carrier has consented to the shipment

Where the carrier has consented to the shipment with the relevant knowledge, the second paragraph gives the same rights “in like manner”, but subject to the qualification that the goods shall have become a danger to the ship and cargo. In such a case, the carrier must clearly be under an obligation to act reasonably, given his overriding obligations as a bailee of the goods, and the fact that he or his agent had given consent to the shipment of the goods in the knowledge that their carriage gave rise to potential dangers.

3. Unreasonable acts of carrier

If the carrier acts unreasonably in his treatment of the goods, it is submitted that that would break the causative chain between the shipment and any resulting damage in accordance with the general principle could amount to a distinct breach of the carrier’s duty to look after the goods, whether simply as bailee or under Art.III.2 of the Hague/Visby Rules. As mentioned above, the loss of or damage to dangerous goods by reasons other than landing, destroying or rendering innocuous would also make the carrier liable.

III. Sacrifice of dangerous goods

1. In general

When the dangerous properties of a particular cargo become manifest and pose a danger to the ship or life and property on board, the master may take necessary measures, such as destroying or jettisoning dangerous goods, to abate the danger. Does the shipper of such a cargo which has been jettisoned or destroyed have a claim for a general average sacrifice against the carrier and other cargo? The principle which underlies general average is that where any property at risk in a maritime adventure is sacrificed, or where extraordinary expenditure is incurred for the common safety, the owners of any of the property at risk which completes the adventure safely should contribute to the loss or expense, in proportion to the values of their property which has survived.

There is a general average act when, and only when, any extraordinary sacrifice or expenditure is intentionally and reasonably made or incurred for the common safety for the purpose of preserving from peril the property imperiled in the common adventure. The desire for uniformity, and the problems of identifying the correct governing law when the adventure ends at more than one discharging port, have led to the international development of a set of voluntary rules, the York-Antwerp Rules, to govern the adjustment of general average between the parties to the adventure, and these Rules are almost invariably incorporated contractually into charter parties and bills of lading and frequently into policies of marine insurance. The York-Antwerp Rules have been regularly revised, most recently in 2004.

2. Effect of fault

An exception to the rule of contribution in general average is also very closely related to dangerous cargoes: if the necessity for a general average act arose as a result of the fault of one of the parties to the adventure, the act retains its general average character and contribution is due from the parties to the adventure, subject to the important exception that the party at fault is not entitled to recover contribution from any other at whose suit the fault was actionable at the time at which the sacrifice or expenditure was made or incurred. The justification for this exception has been attributed to the policy of avoiding circuity of action and to the principle that a person shall not recover from any other person in respect of the consequences of his own wrong.

3. General average resulting from inherent vice or fault of the good

When a claim in general average is resisted on the ground of fault, it is usually the fault of the ship owner which is at issue, but this is not always so. A cargo which has ignited spontaneously may be jettisoned or damaged by firefighting operations and the ship owner and other cargo owners may seek to defend a claim for contribution by the owner of the sacrificed cargo on the ground that the sacrifice arose as a result of the fault of the cargo itself. Earlier it was sometimes advanced that in such a case contribution could not be recovered in respect of sacrifice of cargo if it was the inherent vice of the cargo itself which had caused the danger.

However, this view has been said to involve a fallacy. It is now settled that exactly the same principle applies in this case as in any other. In *Greenshields, Cowie & v. Stephen & Sons Ltd.*, a cargo of coal ignited spontaneously as a result of inherent vice. The cargo was sacrificed and the ship owner, in defense to a claim for general average contribution, relied on the implied exception of inherent vice in the contract of carriage and the statutory exception of fire under Sec. of the Merchant Shipping Act 1894. These arguments were rejected, since the implied exception, while providing a defense to a claim for damage or non-delivery had no relevance to a claim for contribution and the statute does not deal with general average at all. The result would have been different if there had been a breach of contract in the shipping of the coal, since the loss would then have arisen as a result of the actionable fault of the cargo owner who was claiming contribution. However, the ship owner had agreed to carry the coal with full knowledge of its nature. Thus, contribution can be recovered unless the danger arose as a result of actionable fault on the part of the owner of the cargo sacrificed. It is no defense to the claim to show that the damage arose from the inherent vice of the cargo.

4. General average contribution and dangerous goods

Where the carrier exercises his right to land, destroy or render innocuous the goods and the goods were loaded with his knowledge and consent, the cargo owner's rights in general average are expressly preserved by Hague/Hague-Visby Rules Art. IV.6: If any such goods shipped with such knowledge and consent shall become a danger to the ship or cargo, they may in like manner be landed at any place, or destroyed or rendered innocuous by the carrier without liability on the part of the carrier, except to general average, if any.

It is therefore clear that, where the goods were shipped without the requisite knowledge and consent on the part of the carrier, the rule is intended to exclude any claim for general average contribution from the carrier. The reason is that such conduct on the part of the shipper is treated as equivalent to actionable fault, which provides a defence to a claim for contribution. Whether or not the shipper could claim contribution from parties to adventure other than the carrier, such as other cargo-owners, depends upon whether the fault is actionable at their suit. There are good reasons for holding that a shipper of dangerous goods without the knowledge and consent of the carrier is in breach of his duty of care to other cargo- owners, at any rate if he knows or ought to have known of the danger. In such circumstances, therefore, it is contended that other cargo-owners would have a defence to the claim

4.3 DOCUMENTATION

The SOLAS 1974 Convention requires a certificate or a declaration, as well as a container/vehicle packing certificate to be provided along with the dangerous goods shipping documents. One of the primary requirements of a transport document for dangerous goods is to convey the fundamental information relating to the hazards of the goods. It is, therefore, necessary to include certain basic information on the document for the consignment of dangerous goods.

1. Dangerous goods transport document and declaration

In accordance with the regulations of the SOLAS Convention, the IMDG Code requires that the consignor who offers dangerous goods for transport must describe the dangerous goods in a transport document and provide additional information and documentation as specified. The dangerous goods transport document may be in any form, provided it contains all the information required by the IMDG Code. In addition, the dangerous goods transport document shall include a certification or declaration that the consignment is acceptable for transport and that the goods are properly packed, marked and labelled, and in a proper condition for transport in accordance with the applicable regulations. The “Multi-Modal Dangerous Goods Form” contained in Part 5 of the IMDG Code may be used as a dangerous goods declaration, as it meets the requirements of the above-mentioned regulations. The information on this form, as well as that contained in Chapter 5 of the IMDG Code, is mandatory but the layout of the form is not. The declaration of dangerous goods imposes formidable but necessary responsibilities upon the party making the declaration. If the facts in the declaration are not accurate, that party is liable for the outcome. Description of dangerous cargoes in bulk must be fulfilled in accordance with the particular code.

2. Container/Vehicle packing certificate

When dangerous goods are packed or loaded into any container, those responsible for packing the container must provide a “container/vehicle packing certificate” specifying the container/vehicle identification numbers and certifying that the operation has been carried out in accordance with the conditions provided in the IMDG Code.

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper: **Helmut Busset**
Schifferstraße 26
60594 Frankfurt/Main
Germany

Air Waybill No.:
Page: **1** of **1** Page(s)
Shipper's Reference Number:
XXXXXX

Consignee: **ABC Company**
1000 High Street
Youngville, Ontario
Canada

This consignment and signed copies of this Declaration must be handed to the operator.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for: AIRCRAFT CARRIER

Place of Origin: **Frankfurt**

Place of Destination: **Youngville**

Shipment type: NON-RADIOACTIVE RADIOACTIVE

WARNING
Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.

NATURE AND QUANTITY OF DANGEROUS GOODS

UN No.	Proper Shipping Name	Class (or Division / Subcategory / Risk)	Packing Group	Quantity and type of packing	Packing Inst.	Authorization
UN 1816	Propyltrichlorosilane	8 (3)	II	Three Plastic drums x 30 L	813	
UN 3226	Self-reactive solid type D (Benzene/diphenyl hydrazide)	4.1		1 Fibreboard box x 10 kg	430	

Additional Handling Information:
The packages containing UN3226 must be protected from direct sunlight and all sources of heat and be placed in adequately ventilated areas.

24-hours Number +1 905 123 4546

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/packaged, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements herein have been met.

Name/Title of Signatory:
Helmut Busset, Dangerous Goods Manager
Place and Date:
Frankfurt, 01.01.2007
Signature:
Helmut Busset

Picture 4.3.1 Example of shipper's declaration for dangerous goods

5. CONCLUSION

In the carriage of goods by sea, the most common type of damage or loss is loss of or damage to goods. However, there are cases where the carrier suffers loss or damage as a result of the shipment of goods. In this regard, the law relating to “dangerous goods” occupies an important, although often overlooked, aspect of maritime law. The carriage of dangerous goods involves an inherent risk of danger to those concerned with its care. The best way to eliminate the risk would be either to prohibit altogether the carriage of dangerous goods by sea or to impose such measures as would render their carriage impractical. Either way would be unacceptable, hence policy-makers have searched for a middle path, an “acceptable risk”, which lies in between. Regulations have been enacted to reflect the level of “acceptable risk” which translates into practical measures of risk containment. As Part I demonstrates, there are special regulations for all types of dangerous goods. These regulations contain technical and detailed operational procedures. Dangerous goods regulations firstly seek to prescribe rules to ensure the safe carriage of certain goods. Failure to comply with the regulations renders the offending party liable to sanctions in the form of a fine or imprisonment.

Dangerous goods regulations differ in technical details; however, they all have a common aim in providing for risk containment. Firstly, there is a system of documentation which is designed to inform the carrier as to the classification and characteristics of the dangerous goods. Secondly, there are provisions for the proper transmission, and due appreciation, of information relating to the dangerous goods to all concerned. Thirdly, they contain provisions which ensure the proper handling, stowage and carriage of such goods. Additionally, with regard to packaged goods, there must be proper containment of the substance in packages, tanks or receptacles which are sufficient to withstand the ordinary risk of handling and transport by sea with regard to the properties of the goods. In the light of these operational regulations, the actions or conduct of the carrier or shipper may amount to breach of contract. In this regard, operational regulations complement a liability regime. Operational regulations are particularly relevant to the issues of which goods are dangerous, whether adequate notice of the dangerous goods has been given, whether the packaging or container is sufficient and to what extent the carrier knows about the dangerous characteristics of the goods.

In common law, the shipper’s liability for the shipment of dangerous goods without notice to the carrier has been long considered as strict. Under the Rules, the shipper’s strict liability arising from the goods is justified only if the strict liability is restricted to certain groups of dangerous cargo. It is because strict common law liability was modified under the Rules by reducing the duty an obligation to use due diligence. General basis for shipper’s liability is fault and strict liability is an exception. Extending the strict liability to any cargo, whatever its nature destroys the said balance between shipper and carrier in favor of the carrier. Therefore, dangerous goods should be understood to be exceptionally dangerous goods, i.e. the risk and potential damage should be significant.

In this regard, there is no doubt that goods contained in the IMDG Code’s list well qualify to be within this concept. On the other hand, dangerous goods are not restricted to the goods in the IMDG Code, i.e. packaged goods. There are regulations for bulk cargoes. It seems likely that with bulk shipment there is greatest risk of major disasters. On the other hand, the very specialized nature of bulk operations leads naturally to the use of proper equipment and routines. This reduces the risk towards acceptable limits. Hence, a ship owner who specializes in the carriage of a particular cargo is reasonably expected to be aware of the true characteristics of it. Moreover, as it is not packed, there is no element of concealment. However, in any case, shipper must disclose the particular state of cargo. Otherwise liability, strict or fault-based, would be unavoidable. On the other hand, packaged goods usually offer much less opportunity to cause the major accidents, but they are handled frequently and in close proximity to people. They are mixed freely with a great amount of normally combustible material, namely general cargo, in circumstances with a high potential for minor troubles.

However rarely, it is not unheard of that, that packaged dangerous goods cause a major disaster, i.e. loss of the vessel and the death of many people. Since carriers of general cargoes are not specialized as bulk carriers and there are thousands of dangerous goods carried in packaged form in contrast to bulk cargoes, which is limited, the disclosures of the shipper with respect to the nature of the goods and special precautions are of paramount importance. Furthermore, it is clear from the case law that strict liability of shipper arises if the carrier is unaware of dangerous nature of goods. If a notice of dangerous nature given or if the carrier otherwise knows, the strict liability does not become issue except the fact that particular danger is scientifically unknown. However, this is not to say that shipper is entirely exonerated from liability. This is rather to say that in such a case shipper's liability is fault-based rather than strict. As the dangerous nature of bulk cargoes is well known, the shipper's strict liability for damages arising from bulk cargoes rarely arises. It is more often the case that the shipper of dangerous bulk cargo often will be liable for misrepresentations, such as statements on the humidity, temperature etc., i.e. generally for negligence.

Moreover, given heightened spectre of terrorism, the security of dangerous goods shipments has become a priority for carriers, shippers, consignees, emergency respondents and governments. As a result security regulations and requirements adopted first in the U.S. and in the process of being adopted in other countries. Due to these security regulations significant losses may arise from delay or detention of the vessel if the particulars furnished by a shipper are inaccurate. Historically neither maritime law nor marine insurance recognized claims for delay. Today much of this changed and damages for delay in cargo delivery are awarded occasionally. Therefore, it is not justified to make the shipper liable for any delay irrespective of fault by extension the meaning of dangerous to *legally dangerous* cargo. If dangerous cargo causes delay in addition to physical damage, the loss arising from the delay is likely to come within the damage arising from the shipment of dangerous goods.

Applying the policy behind strict liability to the transport of dangerous goods means that a shipper who has created the risk, albeit unknowingly, with the likelihood that the harm would be great if it occurred pays for its consequences. The ultimate goal of strict liability is to prevent harm from occurring in the first place by encouraging people to be aware of the nature of the goods with which they deal. One who possesses a dangerous animal, a defective product or dangerous cargo is in the best position to discover its nature and to perhaps control or warn others. Comparatively speaking, dangerous goods are like dangerous activities in terms of the magnitude of harm they can cause. Thus, although a shipper took great care of packing and handling dangerous goods, he would be strictly liable for damage caused by the dangerous cargo.

The shipper is strictly liable for dangerous goods carried without consent and liable for his fault for damages arising from any type of goods. Moreover, shippers may be liable for damage to the ship during activities such as loading and unloading. A charterer under a charter contract is exposed to even more liabilities. However, neither a limitation under the Hague Rules is available to a shipper nor a global limitation of the ship owner's liability is available to a charterer for damage to the vessel. Limitation of liability evolved from a need to protect investors from huge losses and to promote a fledgling industry. Now shippers and charterers also face extensive losses. The basis of argument for limitation of liability has been, since its inception, largely commercial in nature. It appears that this is still the impetus behind maintaining limitation of liability in the international maritime industry. The focus appears to have shifted from encouraging trade and maintaining the development of shipping to that of capping potential insurance pay-outs. The basis of the argument is that it is simply a matter of insurability and the cost of insurance. Is not this an argument for the insurability of the shipper's or charterer's liability to the carrier or ship owner?

Shippers' interests state the need for limitation in future carriage convention and charterers are in need of some protection against their enormous liability exposures to ship owners. It will be interesting to watch developments in this field. Shipper interest has always rejected to be party liable under the third party liability regimes. Indeed, it is the fact under a contract of carriage a shipper may face extensive liabilities. Shippers and charterers may be in need of insurance protection to cover

their liability arising out of the unknown dangers of dangerous goods. World-wide availability of this insurance for liabilities arising from carriage of dangerous goods and where available if prohibitively priced is a question.

Under the HNS Convention liability is channeled to the owner with limited defenses. One of these defences is unique to the HNS Convention: “No liability shall attach to the owner if the owner proves that the failure of the shipper or any other person to furnish information concerning the hazardous and noxious substance.” Shippers should be cognizant of this fact and should properly disclose the cargo to avoid huge claims. Contribution system under the HNS Convention is more complicated than under the CLC. However, the HNS Convention will ensure the availability of adequate, prompt and effective compensation for damage resulting from shipping incidents involving the carriage of hazardous and noxious substances by sea.

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