1987

Proposal for a standard course for senior personnel involved in the carriage of dangerous goods in packaged form

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PROPOSAL FOR A STANDARD COURSE FOR SENIOR PERSONNEL INVOLVED IN THE CARRIAGE OF DANGEROUS GOODS IN PACKAGED FORM BY THE MARINE MODE OF TRANSPORT

by
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A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE
in
MARITIME EDUCATION AND TRAINING (NAUTICAL).

The contents of this paper reflect my personal views and are not necessarily endorsed by the UNIVERSITY.

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ACKNOWLEDGEMENTS

In preparation of this paper, I am deeply indebted to all those who provided me with the guidance, information and, above all, encouragement which made it possible for me to write this paper.

I would like to express particularly my sincere thanks to:

CAPT. HUBERT WARDELMANN, Head of Cargoes Section International Maritime Organization, for his valuable guidance and information while directing and assessing this paper.

PROF. GUNTHER ZADE, Vice Rector of the World Maritime University and my course professor, for his advice, guidance and for providing me with all the facilities required making it possible for me to write this paper.

CAPT. BERND HODENBERG, Hapag-LLoyd Dangerous Goods Department, for his cordial assistance with valuable information.

MR ERIK NORDSTRöM, Rector of the World Maritime University, for his valuable guidance and assistance.

DR. GAMAL MOKHTAR, Director General of the Arab Maritime Transport Academy, for selecting and sponsoring me to join the university.

DR. ABDEL MENEM SLAMA, Assistant Director General for Education, for his assistance and sponsoring me during my study in the university.

MY SON MOEMEN who have put up with the suffering of lengthy separation - wishing him all the success and good future.

CONTENTS

ABSTRACT

The International Maritime Organization, IMO, is the specialized agency of the United Nations for the marine mode of transport. IMO has a wide range of activities concerning the safety of life at sea, among them is the transport of dangerous goods in packaged form. The organization has issued regulations, recommendations and codes of safe practices in order to ensure the safety of life at sea and protection of the marine environment.

These rules are divided into technical requirements and statutes. IMO has recognized that maritime training and education is the backbone for improving safety.

As a result of this, Annex-2 of Resolution A.537(13) was adopted on November 17, 1983 (Recommendation on Training of Officers and Ratings Responsible for Cargo Handling on Ships Carrying Dangerous Goods and Hazardous Substances in Packaged Form). The introduction of Resolution A.537(13) is a positive step to reduce the risks and to increase the safety in the transport of dangerous goods.

The senior personnel involved in the transport of dangerous goods in packaged form are the decision-makers and they are responsible for the performance of their employee. It is necessary that the interface between the various sectors of the industry should be clearly defined so that all senior personnel will understand the duties and the responsibilities of the other sectors.

Additional training and education will improve their ability and increase their knowledge. The objecitve of this thesis was to make proposal for a standard course for senior personnel involved in the transport of dangerous goods by the marine mode.

My thesis commences with chapter I, and starts from section 1 which gives the historical background of the transport of dangerous goods while in section 2 and 3 I have emphasized upon the tremendous effort done by the UN and IMO when establishing the regulations and codes of safe pracitces. The objective of these three sections is to make the reader aware of the regulatory and technical aspects which personnel involved in the transport should understand.

Section 4 and 5 deals with the implementation of such regulations in ports and shipping companies by describing the management systems and the technical aspects which should be observed by senior personnel as well as others, this reflects again the need of skilled senior personnel.

Section 6, Casualities, describes some major casualities extracted from "Focus on IMO". The purpose of this section is to clarify that even with all existing regulations, recommendations and codes of safe practices, accidents can occur - and they do.

The conclusion of the introductory chapter I will be recognition of the necessity of improving the maritime training and education for all levels of personnel, in particular senior personnel. Chapter II contains a proposal

of a course for senior personnel. The course has been divided into five parts:

Part I	Table of contents of the main subjects
Part II	Course syllabus and timetable
Part III	Course description
Part IV	Methods of evaluating the course and assessment of the knowledge gained by the participants
Part V	General guideline for lecturers, references and visual aids

The course duration is two weeks, total hours 80, lesson duration 45 minutes and the number of lessons is 8 per day.

Finally, I wish to inform the reader that I have gone through many courses established in different countries on the carriage of dangerous goods in packaged form such as:

1. Leith Nautical College (open learning unit for hazardous cargo handling)
2. The College of Maritime Studies Warsash
3. Rotterdam Port Transport College
4. Model Course developed under IMO - Norwegian programme
5. World Maritime University Course in Packaged Dangerous Course by Capt. Hubert Wardelmann and Capt. Karsten Brünings - Sweden
6. World Maritime Dalian Branch "Seminar on the handling and transport of dangerous goods 1985" - China
7. The international symposium on the transport of dangerous goods by sea and in waterways - Rotterdam symposium April 1987; and

other courses from different countries

I have realized that the courses enumareted above are mainly established for either shipping companies or port personnel. None of them are designed for senior personnel in particular. This fact gave me another motive for designing such a course.

In the selection of the course contents, I have considered the requirements of Resolution A.537(13), Annex 2, as well as the syllabuses of the other courses mentioned above and the syllabus required for senior personnel of the industry involved in the dangerous goods.

CHAPTER I

1 THE HISTORY OF DANGEROUS GOODS TRANSPORT

The transport of dangerous goods is a matter almost as old as mankind. Since the first canoe was launched goods of all kinds, including dangerous goods although the operator may not have been aware of it, have been carried on the water.

Less than one hundred years ago, although dangerous goods were already transported by sea, no special regulations were considered necessary. The first regulation was established by the British in the British Merchant Shipping Act of 1894, Article 301 under the heading "Dangerous goods and carriage of cattle". The Article read that "an immigrant ship shall not proceed to sea if she carries an explosive or any vitriol, lucifer matches, guano or green hides or any articles which by reason of the nature, quantity or mode of stowage is likely to endanger the health or the lifes of the passengers or the safety of the ship".

As a result of this article, the Brithish shipping act was considered in the first Convention for Safety of Life at Sea (SOLAS 1914). In this convention the carriage of goods which by "reason of nature, quantity or mode of stowage" were likely to endanger the lives of the passengers or the safety of the ship" was forbidden. Each contracting party would have been obliged to determine from time to time which goods should be considered as being dangerous and to indicate precautions which should be taken

in the safe packing and stowage.
However, the decision as to which goods should be considered to be dangerous was left to the contracting parties.

Although SOLAS 1914 never entered into force, the principle of relying on the administration to decide on the definition and treatment of dangerous goods was established and this resulted in the development of many diversified regulations and practices.

The same attitude was maintained in SOLAS 1929, Article 24, where dangerous goods are mentioned together with life-saving appliances and where it was still left to the Administration to decide on the definition and treatment of dangerous goods.

By 1948 the carriage of dangerous goods had grown. As a result of this, in SOLAS 1948 a new chapter, chapter VI, dealing specifically with "the carriage of grain and dangerous goods" was added. However, during the 1948 SOLAS Conference, it was recognized that the requirements of the Convention were inadequate. They adopted recommendation 22 to stress the importance of international uniformity in the safety precautions for the transport of dangerous goods by sea.

In addition to that, the conference established that goods should be considered dangerous on the basis of their properties and classifications. A labelling system should be developed, using distinctive symbols indicating the kind of danger for each class. It was also stated in recommen-

dation 22 that further studies should be undertaken in order to develop international regulations on the subject.

2 THE ROLE OF THE UNITED NATIONS

The United Nations Economic and Social Council (ECOSOC) established the Committee of Experts on the Transport of Dangerous Goods. In 1956 this Committee completed a report of minimum requirements for the transport of dangerous goods by all modes of transport.

2.1 A VIEW ON THE 1956 REPORT OF THE UN COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

The Committee of Experts on the Transport of Dangerous Goods was appointed in accordance with resolution 4686(XI) adopted on April 15, 1953, by the Economic and Social Council. The Secretary-General appointed a Committee of nine qualified Experts from countries having interest in the international transport of dangerous goods.

2.2 THE TASK OF THE COMMITTEE OF EXPERTS

To prepare a report on certain aspects of the transport of dangerous goods that are susceptible to uniform regulations for all modes of transport on a world-wide scale with respect to:

2.2.1 Classification
2.2.2 Listing
2.2.3 Labelling
2.2.4 Shipping papers

The final recommendations which the Committee recommended

can be summarized as follows:

2.2.1 Classification

In order to introduce a classification system which should be universally applicable to all modes of transport, the Committee was confronted with a variety of classifications included in regulations, some international and of world-wide application, some of regional application only.

The Committee attached very great weight on this situation. The classification of dangerous goods on the basis of the charcter of risk involved, which it recommended, was drawn up to meet technical conditions with the minimum of interference of existing regulations.

The system of classification recommended by the Committee was:

Class 1	Explosives
Class 2	Compressed gases
Class 3a	Substances liable to spontaneous combustion
Class 3b	Inflammable liquids
Class 3c	Inflammable solids
Class 3d	Substances which in contact with water emit flammable gases
Class 4	Oxydizing substances
Class 5a	Toxic substances
Class 5b	Infectious substances
Class 6	Radioactive substances
Class 7	Corrosives
Class 8	Miscellaneous

This classification was very close to some other classification systems applied in some other regulations (see Annex I).

2.2.2 Listing of the principal dangerous goods moving in commerce and assignement of each to its proper grouping or classification

A The Committe of Experts has drawn up a list of dangerous goods applicable to all modes of transport. It also assigned each of these goods to its proper class and it indicated a class corresponding to any subsidary risk.

B The dangerous goods were listed according to the English alphabet. The list is in no way exhaustive. It only shows most of the principal dangerous goods commonly carried. It is interesting to note that it was very similar to the list of dangerous goods passing the Suez Canal. It was recommended that the list be kept up-to-date. New dangerous products are constantly being put on the market. Opinions could differ as to which the main risk is, consequently as to which class they should be placed. In the absence of any agreed criteria, or arbitration by some controling body, new goods giving such doubts, should not be classified in the UN Recommendation.

C The Committee agreed that a system of numbering for dangerous goods would be extremely useful. To the question whether the goods in the list recommended by the Committee should be numbered, it was thought that the list was not sufficiently comprehensive to serve as the basis for a system of numbering. Various systems were considered. Under one system the goods would be numbered within their classes; under another system the numbering would simply follow the alphabet.

2.2.3 Marks or labels for each grouping of classification

The Committee agreed to use labels which, by their nature, made it easier to distinguish the goods and which provide

useful guidelines for handling and stowing operations. The classes of the proposed labels have been chosen so as to distinguish those which on land must be kept apart from each other. The Committee recommended that system which is already widely used in many countries.

The labels were chosen which by their general appearance (symbol, colour and shape) are easily recognized from a distance as indicating dangerous goods. The symbols are combined to five, each corresponding to a main risk, namely:

- a bomb, for the risk of explosion
- a flame, for the risk of fire
- a skull and crossbones, for the risk connected with radioactive substances
- acid spilling from a carboy attacking metal, for the risk of corrosion

In adopting these five symbols the Committee was guided by the work accomplished by the Committee of Experts of the CIM and of the International Labour Organisation (ILO).

The label for class 3d (substances which in contact with water emit inflammable gases) shows a flame which might lead to the use of water to fight any fire breaking out in the goods. The Committee solved the problem by providing the umbrella label as well as of the flame label to avoid the use of water in case of fire.

2.2.4 Dangerous goods shipping papers

When dangerous goods are shipped, in addition to the required shipping papers for ordinary goods, the user must certify either on the shipping paper or in a separate

declaration, that he has put up his goods for shipping in accordance with the operative regulations bearing in mind that the shipper, better than anyone else, knows the nature of the goods. The Committee has prepared a sample-declaration form (see Annex II).

The main points which the Committee proposed:

A The Committee recommended that agreements are made for keeping the dangerous goods list up to date.

B The Committee recommended that for dangerous goods an international system of numbering is laid down at a later stage.

C The Committee recommended that a standard regulation concerning (a) packaging and packing (b) restrictions on mixed packing, weight and quantity limitations in packing should be established in accordance with a comparison of the different systems:
- United Kingdom system for seaborne transport
- Interstate Commerce Commission USA
- Annex I to CIM
- The agreement of January 1954 concerning the inter-national transport of goods by rail

However, little was done concerning the marine mode in response to recommendation 22 , also due to the fact that SOLAS 1948 did not enter into force until 1958.

2.3 The revision of the 1948 SOLAS Convention

In 1959 the IMO (the then IMCO) Assembly met for the first time and one of its first actions was to arrange for a new conference to revise the 1948 SOLAS Convention. This

conference took place in Genova in 1960. Chapter VII of the revised convention which entered into force on May 26, 1965, deals exclusively with the carriage of dangerous goods. With a few exceptions, SOLAS 1960 applied to all ships of 500 Gross Tons or more engaged on international voyages.

Another conference held in 1974 which revised the Convention of 1960. The result of this conference was the 1974 SOLAS Convention wich entered into force on May 25, 1980. In 1981 amendments to SOLAS 1974 were adopted by the Maritime Safety Committee which entered into force in September, 1984. In 1983 another amendments to SOLAS 1974 were adopted by resolution MSC.6 which entered into force on July 1, 1986.

3 THE ROLE OF THE INTERNATIONAL MARITIME ORGANIZATION (IMO) IN ESTABLISHING AND DEVELOPING THE IMDG CODE

3.1

IMO (since May 22, 1982) came into being, as IMCO, in 1958. Its first Assembly met in 1959. 131 states have become members of the organization. Some 27 organizations (specialized Agencies) in the United Nations System, 31 inter-governmental organizations with which IMO concluded agreements or arrangements of co-operation, and 43 non-governmental or international organizations to which a consultative status has been granted, send representatives or observers to meetings of IMO bodies. During the past two decades IMO has become a recognized forum of the maritime community for all matters affecting safety of shipping. The carriage of dangerous goods by sea is one of the responsibilities of IMO.

The IMO Maritime Safety Committee at its third session in November 1960 considered procedures for dealing with 1960 SOLAS Conference Resolution 56 which recommended that governments should adopt a uniform international code in addition to SOLAS chapter VII which provided necessary legal basis for international standards. Such a code should cover inter alia packing and container traffic and stowage with particular reference to the segregation of incompatible substances.

In May 1961 a Working Group on the Carriage of Dangerous Goods was established. The Working Group consisted of considerably experienced experts from different countries. Close co-operation was estblished with the UN Committee of Experts on the Transport of Dangerous Goods which had prepared the 1956 report. The report established minimum requirements for the transport of dangerous goods by all modes. After the Working Group had met ten times, the draft code became known as the International Maritime Dangerous Goods (IMDG) Code. After approval by the Maritime Safety Committee it was adopted by the IMO Assembly in 1965 under Assembly resolution A.81(IV).

3.2 The Maritime Safety Committe and the Sub-committee on the Carriage of Dangerous Goods

The Maritime Safety Committee is alone responsible for safety matters in IMO. Of this Committee the Sub-committee of the Carriage of Dangerous Goods is responsible for all matters concerning dangerous goods. The Sub-Committee meets once or twice a year and one of the main objective is to

keep the IMDG Code up to date.

The Maritime Safety Committee is responsible for the amendments that do not affect the principals of the Code. After the amendments have been adopted, it takes approximately a year to prepare them for publication. This results in the replacement of 400-500 pages in the Code. The amendments to the IMDG Code should be implemented within six months after their publication in english.

The latest edition of the IMDG Code is the edition of 1986. It includes all amendments up to Amendment No 22-86. The Maritime Safety Committee decided to publish that new edition because the edition of 1981 only contained amendments up to No 18-79 while amendments No 19-80, 20-82, 21-83, 21-84, 22-84 and 22-86 were combined. There is a discussion whether to introduce a new IMDG Code that would result in the change of the layout of the Code.

3.3 The latest developments within the organization concerning the General Introduction to the IMDG Code

1 It is the intention of IMO to replace throughout the IMDG Code as many references as possible to competent authority approvals by straightforward recommendations, standards, provisions or requirements. Governments are invited to make proposals to such replacements.

This will be a continuous task for years to come. To give the IMDG Code the desired status vis-á-vis revised Chapter VII of the 1974 SOLAS Convention, as amended, and Annex III of MARPOL 73/78 and revised Protocol I thereto, it is

important that the references to competent authority approvals be replaced by internationally acceptable standards.

2 Another important undertaking by IMO was the revision of the stowage and segregation requirements of the IMDG Code (section 15 of the General Introduction) which involved also sections 12, 13, 17 and 19 of the General Introduction.

3 The discussion on this subject was originally initiated in the Joint RID/ADR Meetings in Berne and Geneva (Switzerland) in their efforts to develop Special Appendices to RID and possibly ADR for the Carriage of Dangerous Goods on Short Sea Voyages.

4 With Amendment No 23-86 to the IMDG Code, which entered into force on April 6, 1987, a new section 23 on marine pollutants was added to the General Introduction to the IMDG Code.

5 With Amendment No 25-88, which will enter into force on July 1, 1990, a new section 24 on the transport of solid bulk materials possessing chemical hazards and a new section 25 on the transport of solid dangerous goods in bulk packagings will be included in the General Introduction to the IMDG Code.

4 DANGEROUS GOODS IN PORT AREAS

A port where dangerous goods are handled is likely to be the place where two distinct transport modes meet, sea and land. Their respective standards, aims, terminology and

requirements concerning safety could result in different interests which can lead to accidents. Accidents usually occur due to human error or negligence so safety knowledge in a port should be considered with the conception that any expected accident may be contained. On the other hand, port operations should follow strict requirements to fulfil the nature of both modes, sea and land modes.

Since every port is an uniqe product due to historical and geographical circumstances, each port must be designed individually taking into account physical siting, local regulations, workforce quality and discipline. This is according to IMO Assembly resolution A.289(VII) adopted on November 20, 1983 which recognizes the need to provide a standard frame within which a port authority formulates their own port-regulations concerning dangerous goods according to the nature of the port and the volume of dangerous goods handled.

The port authority must bear in mind that their port regulations have to fulfil IMO Assembly resolutions A.81(IV), A.120(V) and A.230(VII) according to the IMDG Code in order to obtain homogeneity.

In order to give examples of the differences in systems and regulations in ports, I have chosen to describe the systems of controlling dangerous goods in the two European ports of Hamburg and Rottedam.

4.1.The port of Hamburg

In the port of Hamburg the waterways police is the only authority competent for all matters concerning the transport of dangerous goods on seagoing ships and on crafts on inland waterways. All staff are marine officers or masters. In the port area there are four police stations for the control of dangerous goods. All four stations are linked together to a chief office called "Zentrale Meldestelle für gefährliche Güter".

Regulations:
The regulations are divided as follows:

International regulations:

(1) International regulation "IMDG Code", for seagoing vessels.

(2) RID carriage by rail in the European area.

(3) ADR carriage by road in the European area.

National regulations:

National regulations are very similar to those of RID and ADR.

4.1.1 Port regulations

The Hamburg port regulations are close to the IMO Recommendation on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas in addition to that they are taking into consideration the nature of the port itself.

General view on the most important port regulations:

- All dangerous goods have to be reported to the waterways police 24 hours before they are brought into the port area.

- The dangerous goods should be packaged, marked and labelled as required by the IMDG Code.
- Handling of dangerous goods is allowed only under supervision of a responsible person who has attended a "Package of dangerous goods course".
- At the gangway there must be a placard saying "Attention dangerous goods on board".
- Quantity limitation for some highly dangerous goods as for example explosives, organic peroxides, some gases and others. These limitations are different for storage, loading, discharging and transit.
- In case of any accident involving dangerous goods the waterways police must be informed.
- Smoking and use of fire near dangerous goods on board or or in the port is forbidden.

The above mentioned regulations are just a short summary of the regulations of the port of Hamburg in order to give the reader an idea of what is regulated and in what way this is done.

4.1.2 The duties of the waterways police

As mentioned before all dangerous goods must be reported to the waterways police. In practice the Chief Office must receive a copy either of the dangerous goods declaration or of the dangerous goods list with the following details:

- the kind and number of packages
- the correct technical name
- the class and UN number
- gross weight; and
- name of ship and berth

This information is checked in the Chief Office as follows:

- if the package is too heavy
- if the kind of packaging is according to the IMDG Code

- if the quantity of the dangerous goods loading or discharging is within the port regulation or quantity limitation
- if technical name and UN number belong together
- if the loading or discharging operation could be carried out at the berth where the ship is moored; and
- if any special permission is required

After having checked, the Chief Office will send the papers to the police station of the area in which the ship is moored. If there are any remarks these will be mentioned in the papers.

4.1.3 The police station duties

Another check will take place on the spot by the police station. The check will be as follows:

- the package is inspected for damaged labels
- the storage on board is controlled
- the segregation of goods on board according to the IMDG Code requirements
- the handling of dangerous goods during loading or discharging is controlled

4.1.4 Implementation of the port regulation

The measures for the implementation of port regulations are very much dependent upon the kind of mistakes found by the police and the circumstances. For instance, it is not possible to forbid a ship to leave the port if only a few packages do not bear the labels required, but it is possible to retain a ship if dangerous goods that are incompatible are loaded in one hatch. The measures which the waterways police generally follow can be summarized as being:

- an order to put labels on the packages
- refusal of wrong or damaged packages

- an order to repack the goods; and
- an order to discharge a consignment or to load it into another hold

4.2 The port of Rotterdam

I have dealt with the port of Hamburg concerning the control of dangerous goods operations in the harbour from the regulating and systematic point of view. I will now deal with the port of Rotterdam where new studies are being conducted to develop greater safety in the harbour during dangerous goods operations. By this I will clarify the necessity of developing the port when the responsible authority feels the need to change the system and regulations in order to achieve more safety and control.

The authorities of the port of Rotterdam recognized the need of renewal of the safety aspects due to the increase in the total amount of hazardous materials transported via the port and also because of the tendency to build residential quarters close to the harbours.

A study-working group has been formed by the Central Environmental Control Agency "Rijnmond" and the Rotterdam Port Authority with the support of Bundesanstaet für Materialprüfung in Berlin which carried out drop tests with tank containers.

4.2.1 Port regulations

Before looking at the study itself it is important to know the regulatory aspect of the port of Rotterdam. The rules and regulations are as follows:

Transhipment of materials:

(a) Transhipment are partly regulated by the rules of the Rotterdam Port Authority and partly by the nuisance

act.

(b) Movements of ships:

- Mooring of ships transporting dangerous goods are regulated by the rules of the Rotterdam Port Authority.
- Handling and storage of dangerous goods on the piers are regulated by the nuisance act.

(c) During transhipment activities from ship to pier:

- Both the rules of the Rotterdam Port Authority and of the Central Environmental Control Agency, are to be fulfilled. For that reason it is necessary to have a joint team of the Rotterdam Port Authority and of the Central Environmental Control Agency in order to have legislative tools in agreement with each other.

4.2.2 Cargo activities in the port:

The working group set up a plan in order to know and identify the problem by using statistics clarifying cargo activities in the port. They found that during the period of 1972 to 1984 the transported weight grew from 22 million tons up to 42 million tons per year (see table I).

Table I

Total transhipment in the port of Rotterdam 1973-1984 (10^6 tons)

	1973	1975	1980	1983	1984
crude oil	162.1	136.6	118.7	75.2	78.2
products	38.6	33.9	35.3	35.1	31.6
coal, ores, grains	35.3	43.8	53.4	41.1	52.8
general cargo	27.9	27.2	36.4	39.8	42.1
TOTAL	294.6	273.3	279.3	232.6	243.3

They also found that there is a tendancy to use larger transport units. The general cargo handled by means of containers was in 1972 27% which in 1984 had grown to 59% (see table II).

Table II

Transhipment (general cargo) via the port of Rotterdam (10^6 tons).

Year	Lash	Ro/Ro	Containers	Other	Total
1972	-	2.441	5.964	13.610	22.015
1973	-	3.751	9.647	14.532	27.930
1974	1.156	4.341	11.299	14.973	31.769
1975	1.701	2.729	10.026	12.737	27.193
1976	1.682	3.210	11.990	13.741	30.624
1977	1.863	3.177	13.473	12.561	31.074
1978	2.034	3.649	16.643	13.493	35.819
1979	1.390	3.881	17.607	11.586	34.464
1980	1.559	3.765	19.247	11.782	36.355
1981	1.441	3.843	21.112	11.122	37.518
1982	1.092	4.586	22.122	10.672	38.478
1983	1.217	4.409	23.405	10.882	39.913
1984	1.607	4.468	25.993	10.064	42.132

The statistics show that due to the increase of transshipment of dangerous goods via the port of Rotterdam a review of the system and of the regulations is necessary. Important to note is that most of the dangerous goods operations are carried out in the east part of the port where the distance to the resedential quarters is very short, in some cases less than 50 metres. This short distance could be a vital reason of a catastrophe in case an accident occurs

4.2.3 How was the study done?

- The working group started by studying statistics showing the amount of IMDG Code movements in the port of Rotterdam. They found that 4300 movements took place during a period of 3 weeks in 1980.
- They determined that a major part of the transhipment activities covered the loading and unloading of corrosives (class 8), flammable liquids (class 3), toxic liquids (class 6.1) and of the liquified gases (class 2).
- After that the working group analysed accidents that had occured in the port, they found that most of the accidents happened during transportation of dangerous goods packed in drums, cylinders and in tank containers.
- Calculations were carried out using physical models for the release of liquids through holes. In this way they calculated the evaporation and the dispersion in the atmosphere. They found that the vapour of flammable products could result in explosions.

As a result of the study it was concluded that accidents involving specific containment with dangerous goods may lead to the risk of lives within the resedential areas in the neighbourhood of the port.

The result of the calculations is given in tabel III which indicates the distance travelled by different gases according to the containing capacity.

Table III

Containment	Ammonia	Chlorine
50 ltr	100 m	200 m
150 "	130 "	300 "
1000 "	260 "	1450 "

Distance of lethal concentration in metres. Weather type Pasquill "D", wind 5 m/sec.

After the general view of the study, it is important to know the final regulations that are formulated below. The regulations apply to:

- Toxic and flammable gases
- Toxic flammable liquids
- Toxic liquids
- Toxic corrosives

Regulations:

After the working group had reached the above described conclusion their recommendation for the new regulations were submitted to the Port Authority as follows:

- The transhipment of dangerous goods is forbidden within the areas at a distance from 0 to 100 metres to the nearest residential quarter.
- The transhipment of dangerous goods which cannot cause risk beyond a distance of 100 metres is allowed for areas at a distance between 100 to 300 metres from residential quarters.

- Transhipment of dangerous goods that cannot cause risk to life beyond 300 metres is allowed.
- There is no limitation of transhipment of dangerous goods at a location of more than 500 metres to the nearest residential quarter.
- For transhipment in units containing 50 litres or less there is no limitation.

These rules were accepted by the Public Authority Rijnmond and by the Rotterdam Port Authority in 1986.

Conclusion:

The idea of analysing the study of the port of Rotterdam is to emphasize upon the scientific methods that should be followed in order to improve the safety of the port against hazards that can occur due to carelessness or ignorance by the responsible authorities.

The importance of the training and qualification of the management in order to be able to achieve the safety requirements in their ports and to make the right decisions is also emphasized.

The study procedures can be summarized as follows:

- The problem was identified by using statistics concerning the amount of dangerous goods.
- The most common dangerous goods classes activities in the port was defined by using statistics.
- The physical and geographical positions of the piers was defined.
- An analysis of the accidents occured in the port areas was done bearing in mind safety, economi and the special circumstances of the port.

5 DANGEROUS GOODS MANAGEMENT WITHIN A SHIPPING COMPANY

After the presentation of the operational systems in the ports I will present operational systems in shipping companies to see the implementation of the IMDG Code in the different aspects that are covered by the Code.

In most of the large shipping companies there is a special department responsible for fulfilling the requirements of the IMDG Code and for ensuring the safety required for the safe transport of dangerous goods.

I should like to stress the importance of using the most advanced technology in order to facilitate the performance of their job.

5.1 The dangerous goods department

The main objective of this department is to implement the IMDG Code requirements on board all ships owned by a company involved in the transportation of packaged dangerous goods.

The procedure of the system:

A The dangerous goods Department receives booking request from shipper channeled through inland freight office, agent or partner line.

B The Department will check that the booking is in compliance with relevant regulations by checking the following:
   - UN number
   - Proper shipping name:
     * correct technical name
     * analogous to the IMDG Code
   - Packing requirements (according to the IMDG Code)

- Stowage/Segregation requirements:
  * according to the IMDG Code
  * according to company or partners company rules
- Emergency schedule number (EmS No) and Medical First Aid Guide table (MFAG table)
- Port regulations (by law)
- Classification for European inland road transportation
- Remarks; if applicable
- Properties
- Observations pertaining to hazard/risk
- Protective clothing
- Measures to be taken in case of leakage
- Firefighting

C After checking all points mentioned above and found to be satisfactory, the department produces a telex containing booking acceptance, which is to be sent to the booking coordinator with simultaneous information to the port agent.

D A summary of all dangerous goods booking already being accepted will be prepared to give the up-to-date view on dangeous goods to be loaded or discharged.

E A summary per class distinguishing on deck or under deck stowage will be prepared in order not to violate against the port limitations and to always have an up-to date view of dangerous goods quantities by weight.

F A computer can print a telex tape and/or a plain text with emergency measures to be taken in case of fire spillage, etc.

G The use of a computer in the checking procedure is very important and it gives a quick answer to any question concerning dangerous goods. There is a program where all IMDG Codes will be stored and by entering the UN number or the technical name, all information required; emergency procedure, stowage, segregation and packaging

regulations can be obtained.

Another advantage with the use of computer is that the regulations of different ports can be stored, which means that any information required concerning the regulations and quantity limitations for any port can be obtained. The computer programme should always be kept up-to-date.

5.2 Some criteria checked by the department

A Is the relevant ship suitable for the relevant dangerous goods consignement?

B Are the limitations announced by authorities of transit not exceeded?

C Is it necessary to obtain transit permissions from any way ports?

D Are certificates that are compulsory in certain cases available?

E Art there any other laws which must be adhered to (atomic law, environmental, control law for war-weapons, etc)?

5.3 Advisory services of the department

A Giving advice to persons responsible for the packing of a container in order to stuff only goods that are mutually compatible into containers.

B Preparing and sending a summary of dangerous goods to the tonnage centre in order to enable the tonnage centre to plan stowage of containers to be loaded on the relevant ship (see Annex III).

C Receiving a summary of dangerous goods containers from the tonnage centre with inserted stowage location for each container in order to check proper segregation of dangerous goods in containers to be loaded. For this purpose a stowage plan must be prepared simultaneously with the tonnage centre.

D Inspecting containers stuffed with dangerous goods prior to loading on behalf of the ship's master (see Annex IV).

E Preparing a dangerous goods container inspection report.

5.4 Safety considerations of the department

A Is the container dry and clean?

B Are all irrelevant dangerous goods placards removed?

C Are the loaded packages in good order?

D Are the packages labelled with IMO dangerous goods labels?

E Are the goods packed tight inside the container and secured against shifting?

F Are different goods inside the container mutually compatible?

G Are the containers marked and placarded in accordance with the regulations?

5.5 Documentation checking

The department is responsible for checking all documents concerning dangerous goods by checking the following:

A dangerous goods list with final stowage location,

B container packing certificates and shippers dangerous goods declarations, and

C dockreceipt

5.6 Conclusion

After my presentation of the system of controlling dangerous goods in shipping companies I wish to emphasize that the success of such a system is based upon highly qualified personnel that will be able to fulfil the requirements of the system. This fact reflects the need to have training programmes for those involved in the job. As mentioned above, the job involves shore-staff, masters, deck-officers, agents, shippers and port authorities. In order to have a succesfull fulfillment of the requirements, all of the above mentioned personnel should receive the necessary

training according to their task in the job (see flow chart Annex V).

6 CASUALITIES

Casualities are often tragedies, which in turn cause the loss of lives, properties and damage to the environment. However, they should be regarded as usefull experiences, by analysing the accident's investigation report to define the reasons why the accident occured. It will provide the reason of the accident and thereby prevent its repetition.

The regulations, recommendations and codes of safe practice are the tools for prevention/minimization of the occurance of accidents, provided that they are understood and implemented by the personnel involved in the transport of dangerous goods. However, the results of analysis have shown that many accidents occurs due to negliance or ignorance of the personnel involved.

An accidents analysis should also indicate if it is necessary to issue new regulations or amend the existing ones.

During the last hundred years many accidents have occured. Dangerous goods have been involved in some of the worst disasters in the history of shipping.

The following casualitites are subatracted from "Focus on IMO":

Halifax, 1917

Explosives are normally treated with great care on board ships but by the end of 1917, with the world war at its height, the Allies' main concern was to get ammunition to the front as quickly as possible. As a result of the 3 000 ton freighter Mont Blanc was heavily overloaded with more than 2 600 tons of explosives when she entered Halifax harbour on her way from the United States to Europe.

Following a series of navigational errors which have never been satisfactorily explained she collieded with another ship, the Imo, and caught fire.

Shortly afterwards the ship exploded in the biggest man-made explosion until the advent of the atomic bomb. The blast devastated the centre of the port. As many as 3 000 people were killed, 9 000 were injured and 6 000 homes were completely destroyed.

Bombay, 1944

The freighter Jala Padmu was carrying 1 400 tons of explosives when she entered Bombay harbour - but her cargo also included a large quantity of cotton which had been taken on board in Karachi. Cotton sounds innocuous enough, but as the IMDG Code points out, "it is liable to spontaneous combustion, especially when contaminated with oil..." and several drums of oil had also been loaded on to the ship and were separated from the cotton only by a badly-fitting sheet of tarpaulin.

Fire broke out, perhaps through a carelessly dropped

cigarette, but just as likely, through spontaneous combustion. The danger was not immediately realized there having been several similar fires in the port in the previous months and the fire-fighting response was slow to materialize and poorly executed. There were two explosions, as a result of which 1 250 people were killed and 15 ships destroyed or damaged.

The Court of Inquiry decided that steam should have been used to fight the fire, but the use of steam as fire-fighting as agent is now frowned upon. The Emergency Procedures state that when substances, such as contaminated cotton, catch fire the correct action is 'Batten down: use ship's fixed fire-fighting installations. Otherwise adopt action as for "on deck" (which is to "use water jets").

Texas City, 1947

With the ending of World War II, demand fell off for ammonium nitrate, a raw material for the production of various explosives, however the substance is also widely used as an agricultural fertilizer and in the immediate post-war period vast quantities were shipped from the United States to Europe, where it was urgently needed.

The freighter Grandcamp was one of many ships used for this purpose and in April 1947 was being loaded with ammonium nitrate in the port of Texas City. The longshoremen noticed that a fire had started in one of the holds and asked for water to put it out. The only supply available consisted of two jugs of drinking water and a two-gallon fire extinguisher. Naturally enough, this failed to quell the blaze but the ship's master refused to allow a hose to be used on the grounds that the water might damage the cargo. As a result the fire spread and by the time the fire

department had been called it was too late: less than an hour later the ship exploded with such force that the two light planes flying overhead were destroyed by the blast. The explosion also blew the hatch covers off another ship, the High Flyer, which was moored 200 yards away and was also carrying ammonium nitrate. She caught fire and subsequentely blew up.

A total of 468 people were killed, mostly as a result of the first explosion.

The subsequent inquiry exposed numerous deficiencies. The cargo on board the Grandcamp was labelled 'fertilizer compound' which had a lower freight rate than ammonium nitrate and no danger labels were attached. As a result, the longeshoremen were unaware of the danger and failed to take the normal precautions such as banning smoking.

The fire-fighting methods used were also wrong. Attempts were made to extinguish the fire with steam which probably made things worse. The IMO Emergency Procedures now advise that a fire involving ammonium nitrate should be fought with large quantities of water and that steam or inert gas should not be used.

Brest, 1947

Ammonium nitrate was involved in another disaster barely three months after the Texas City explosion. This time the ship involved was the Ocean Liberty which caught fire in the harbour of Brest.

The authorities had learned enough from the American incident to get the ship out of the port as soon as possible but fire-fighting methods failed just as

dramatically. Again steam was used and the firemen were not equipped with breathing apparatus. Their attempts to remove the hatch covers and pump water into the ship were made too late and the ship exploded, killing 21 people.

Bahrain, 1957

Toe puff is a mixture of cotton or wool impregnated with cellulose and is used to make safety caps for shoes. But although the finished prouct might be safe, toe puffs can be very dangerous in the raw state. The IMDG Code advises that the substance: 'Ignites readily. When involved in a fire toxic fumes are involved. In closed compartments, these fumes may form an explosive mixture with air.'

That is exactly what happened on board the freighter Seistan as it approached Bahrain. Fire broke out and to make matters worse the toe puffs were stowed beneath the ship's magazine. Attempts were made to smother the fire with steam, to no avail. The ship blew up, killing 57 people.

The correct procedure, according to the IMDG Code, is to deluge the fire with water. The Code also advises that self-contained breathing apparatus and protective clothing should be worn.

The Tacoma, 1970

The dangers of gases in the cargo tanks of oil tankers are well known and considerable work has been done by IMO to combat the problem. But many flammable liquids give off explosive gases and the danger is not confined to the ship itself.

The Tacoma was a tank barge which regularly carried 4 000

tons of pryolysis gasoline along the Manchester Ship Canal. In April 1970 she arrived at the Partington Coaling Basin to be unloaded.

At this point the Ship Canal was crossed by a small ferry. On the morning of 14 April the ferry operator noticed a very strong smell which so alarmed him that he decided to alert the authorities. While he was away, eight of his prospective passengers decided to cross the canal by rowing boat.

On the way, gases in the air suddenly ignited, setting fire to the clothes of some of the passengers. Soon the liquid on the canal itself caught fire, sending flames 50 feet into the air. The ferryman had in the meantime gone to their assistance, but he and five of the passengers died in the blaze and the other three were badly burnt.

The accident resulted from the accidential discharge from the Tacoma of 84 tons of gasoline which poured across the deck and through the scuppers into the river. It was never established exactly how the gas formed was ignited, but the inquiry proved that procedures during unloading had been very lax. In particular, the ship's scuppers should have been plugged.

IMO's Recommendations on the Safe Transport, Handling and Storage of Dangerous Goods in Port Areas, if correctly observed, would avoid a recurrence of the Tacoma accident.

Los Alfraques, 1978

Liquefied gases have become a very important source of energy during the last two decades and the accident record of the ships which carry them has been extremely good.

There has been no major incident at sea, but there have been enough on land to show just how dangerous such substances are if not correctly handled.

In July 1978, a road tanker transporting liquefied Propylene sprang a leak as it passed a camp site at Los Alfraques in Spain. It was the peak of the summer tourist season and the camp site was crowded.

The leak resulted in some of the liquefied gas escaping and pouring rapidly across the camp site in a huge cloud, which immediately ignited - possibly as a result of coming into contact with flames from one of the many camp stoves in use at the time.

The explosion resulted in a fireball some 200 yards in diameter which was so intense that more than 150 people in the camp site were burnt to death. The devastation spread for 400 yards in all directions.

Yet the lorry carried only 43 cubic metres of liquefied gas. Some ships carry 125 000 cubic metres or even more.

Port Kelang, 1980

Three people were killed and more than £12 million worth of damage was caused by a fire and series of explosions in this Malaysian port.

The fire began in a warehouse and although fire engines arrived within ten minutes of the alarm being given, the flames had taken such a firm grip on the building that the firemen were unable to control the blaze. Their efforts were hampered by the fact that cargo in the warehouse was piled right up to the roof: they could not, as a result,

get to the root of the fire.

A series of explosions occurred about 1 1/2 hours later, the third of which was so great that burning debris led to fires starting elsewhere in the port - and at the same time knocked out most of the fire engines. It is believed that the explosion may have been caused by empy gas cylinders which were heated in the fire to such an extent that they finally blew up.

The fire raged for two days, destroyed four warehouses completely and severely damaged virtually every other building in the port.

The reason of the section "Casualities" is to give the reader an idea of the tragedies of accidents where dangerous goods are involved and to emphasize the need of improving the knowledge of personnel involved in the transport of dangerous goods.

Conclusion:

1 Although the UN and IMO have made tremendous efforts by establishing the necessary regulations, recommendations and codes of safe practice concerning the transport of dangerous goods, it is clear that in order to implement such rules, qualified personnel are required.

2 The description of the management systems of ports and shipping companies will again emphasize the need for training and education in order to have skilled personnel that are able to ensure the necessary functions of the systems are carried out.

3 The description of the different casualities also

reflects the necessity for training.

Recommendation:

The three points mentioned in the conclusion gave me the motive to propose a standard course for senior personnel involved in the carriage of dangerous goods in packaged form by the marine mode of transport.

CHAPTER II

PROPOSAL FOR A STANDARD COURSE FOR SENIOR PERSONNEL INVOLVED IN THE CARRIAGE OF DANGEROUS GOODS IN PACKAGED FORM BY THE MARINE MODE OF TRANSPORT

Introduction

This is a proposal for a standard course for senior personnel involved in the carriage of dangerous goods in packaged forms by the marine mode of transport.

The course takes into consideration the experiences of different personnel as well as their training and education.

However, the tasks of personnel employed to perform the various functions in the transport chain of dangerous goods vary. It is necessary that the interface between the sectors of industry should be clearly defined so that all senior personnel will understand the duties and the responsibilities of the other sectors. Additional training and education will improve their ability and increase their knowledge which will ensure safety in the carriage of dangerous goods.

Before I go on, I should like to clarify who the senior personnel involved in the transport of dangerous goods in packaged form are. In order to do this, one can divide them into the following categories:

- Administrators of all levels (technical advisors, senior officers)
- Port authorities (harbour masters, pilots, senior

officers in cargoes sections and traffic control)

- Port users (carriers, forwarders, agents, masters, deck officers, port captains, senior officers responsible for shipping department)
- Warehousing personnel (supervisors of storage areas)
- Shippers (consignors) (senior officers responsible for shipping)
- Training institutes (professors, lecturers)
- Marine and cargo surveyors and ship inspectors
- Safety and security bodies (emergency response organization's senior staff)
- Coast guard (senior officers)
- Fire brigade (senior officers)
- Packaging industry (senior officers)
- Manufacturers of dangerous goods (senior officers)

As the categories mentioned above show the professional background of the key senior personnel vary considerably, so it is clear that all subjects should not be compulsary for all. The arguments for which subjects should be options will be presented in Part IV, "Evaluation".

In the design of this course, the required syllabus of IMO Assembly resolution No A.537(13) adopted on November 17, 1983, has been covered.

One of the important points an institute should consider is the timetable. It is recommended that the institute should be in contact with the industries in order to determine the best time for running a course; morning, and/or afternoon and evening-classes. A course could

also be arranged for weekends.

However, the course timetable proposed for this course is done to fulfil the sequences that should be followed to enable the participants to understand the contents in a easier way and to help them build up their knowledge in order to achieve the objectives and aims of this course. In case another timetable is used, the sequences of the timetable should be adopted.

General course objectives:

1 To give the participants the knowledge, information and description of the various sectors in the carriage of dangerous goods in packaged forms. To enable them to understand the properties and characteristics of dangerous substances: their hazards, classification, packing, handling, stowage, segregation and securing.
2 To make the participants familiar with international and national regulations, controlling dangerous goods transport by sea and to give them insight into the various sectors of transport of dangerous goods by sea.

Teaching staff:

1 All teaching staff should fully understand the objectives and aims of the course as well as the subjects. The latter will be described in part III of the course.
2 One permanent lecturer with a good knowledge of the transport of dangerous goods should be available. To cover special subjects, other lecturers have to be recruited from the industry as and when required.

3 One senior lecturer should have experience in industrial chemistry as well as practical experience in the transport of dangerous goods.

Entrance requirements and limitation on the number of participants:

Participants should have a certificate of competency, or a BCs degree as well as some basic knowledge in the transport of dangerous goods.

The ratio of participants to lecturer should be 20:1 during lectures. The ratio to instructors should be 10:1 in laboratory experiments and demonstrations.

Method for designing the course:

The course has been divided into the following parts:

1 Part I - Table of contents of the main subjects
2 Part II - Course syllabus and timetable
3 Part III - Course description
4 Part IV - Methods of evaluating the course and assessing the knowledge gained by the participants, follow-up system
5 Part V - General guidelines for lecturers, references, visual aids

PART I

TABLE OF CONTENTS OF THE MAIN SUBJECTS

PROPOSAL FOR A STANDARD COURSE FOR SENIOR PERSONNEL INVOLVED IN THE CARRIAGE OF DANGEROUS GOODS IN PACKAGED FORM BY THE MARINE MODE OF TRANSPORT

Main subjects of the course:

1 Introduction
2 Basic science including intrinsic hazards and risks of substances
3 Health hazards
4 Regulations, requirements, recommendations and codes of safe practice

5 Classification
6 Packing
7 Identification, marking, labelling and placarding
8 Transport documentation (certification and declarations)
9 Handling, stowage/storage and segregation
10 Dangerous goods in port areas
11 Dangerous goods management within a shipping company
12 The marine pollution aspect

13 Emergency procedures and safety precautions
14 Securing of dangerous goods in packaged forms
15 Accident investigation
16 Medical First Aid in Accidents involving Dangerous Goods
17 The role of administrations and competent authorities
18 Case studies
19 Training

PART II

COURSE SYLLABUS AND TIMETABLE

1 INTRODUCTION

(2 hours)

1.1 Presentation of the course

1.2 Categories of senior personnel involved in and responsible for dangerous goods transport operations

1.3 Historical background of dangerous goods transport operations

1.4 The transport of dangerous cargoes by sea as a link in the chain of multimodal transport operations

1.5 The need and importance of training

2 BASIC SCIENCE INCLUDING INTRINSIC HAZARDS AND RISKS OF SUBSTANCES

(8 hours)

2.1 Elementary physics

2.2 Organic chemistry

2.3 Radioactivity

2.4 Combustion

2.5 Explosions

2.5.1 Potential hazards

2.5.2 Sources of ignition

2.5.3 Spillage of hazardous substances

3 HEALTH HAZARDS
(2 hours)

3.1 Toxicity
3.2 The IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods

4 REGULATIONS, REQUIREMENTS, RECOMMENDATIONS AND CODES OF SAFE PRACTICE
(4 hours)

4.1 The International Convention for the Safety of Life at Sea 1974 (SOLAS) as amended in 1981 and 1983
4.2 RID/ADR - The European Conventions for the Transport of Dangerous Goods by Rail/Road
4.3 The United Kingdom "Blue Book"
4.4 The United Nations Recommendations on the Transport of Dangerous Goods - The "Orange Book"
4.5 UN Committee of Experts on the Transport of Dangerous Goods
4.6 The IAEA Resolutions for the Safe Transport of Radioactive Material 1985 and 1986 Supplement
4.7 The International Maritime Organization (IMO) in the United Nations System with particular emphasis on the carriage of dangerous goods
4.8 The IMO Sub-Committee on the Carriage of Dangerous Goods
4.9 The International Maritime Dangerous Goods (IMDG) Code, its Annex I (Packing Recommendations) and Supplements (the EmS and the MFAG)
4.10 The Code of Safe Practice for Solid Bulk Cargoes

5 CLASSIFICATION

(4 hours)

(Film: Basic fire chemistry)

5.1 The UN classification system

5.2 Definitions

5.3 Classification criteria of dangerous goods transport in packages

5.4 Classification of substances, materials, or articles with multiple hazards

5.5 Classification of solutions and mixtures

5.6 Data sheet for dargerous substances

5.7 Packaging groups according to the degree of danger

6 PACKING

(4 hours)

(Film:Tank containers in the fire test)

6.1 Regulation 3 of Part A of Chapter VII of SOLAS 1974

6.2 General view of section 10 of the IMDG Code

6.3 Dangerous goods in limited quantities and mixed packing (revised section 18 of the IMDG Code)

6.4 Grandfather clause

6.5 Equivalences

6.6 Glossary of packaging

6.7 Packing provisions for the substances and articles in the various classes of the IMDG Code

6.8 Unit loads, vehicles, trailers in purpose built cargo ship

6.9 Freight containers

6.10 Portable tanks and road tank vehicles

7 IDENTIFICATION, MARKING, LABELLING AND PLACARDING
(2 hours)

7.1 Identification
7.2 Marking
7.3 Labelling
7.4 Placarding of cargo transport units

8 TRANSPORT DOCUMENTATION (CERTIFICATION AND DECLARATIONS)
(2 hours)

8.1 The Convention on Facilitation of the International Maritime Traffic 1965
8.2 Regulation 5 of Part A of Chapter VII of the International Convention for the Safety of Life at Sea (SOLAS 1974) as amended
8.3 Documentary aspects of the international transport of dangerous goods
8.4 Documentation
8.5 Main points in the declaration text
8.6 Main data elements of the declaration
8.7 The different transport documents

9 HANDLING, STOWAGE/STORAGE AND SEGREGATION
(4 hours)

9.1 General regulations and requirements
9.2 Stowage
9.3 The importance of safe handling - stowage/storage
9.4 Stand by requirements when handling certain dangerous cargoes

9.5 Preparations and procedures for the safe handling of certain dangerous cargoes

9.6 Purposes of segregation

9.7 The main activities that must be carried out in ships carrying dangerous goods

9.8 Overview of new subsection 14.8 of the general introduction of the IMDG Code

9.9 The general segregation table

9.10 Segregation terms, exercises on the terms and the use of the segregation table

9.11 Overview of section 15 of the general introduction of the IMDG Code

9.12 Segregation of freight containers on board container ships

9.13 Segregation of cargo transport units on board ships

9.14 Segregation on board barge carrying ships

9.15 Dangerous goods in bulk packaging

9.16 Dangerous and hazardous cargoes in solid form bulk

10 DANGEROUS GOODS IN PORT AREAS

(4 hours)

10.1 The position of the port

10.2 Available facilities in ports

10.3 Port legislation (dangerous substances)

10.4 Administration

10.5 Systems of transformation of information

10.6 Documentation

10.7 Acceptance of packaged dangerous goods

10.8 Categorization of dangerous goods in port areas for handling and storage purposes

10.9 Quantity limitations

10.10 Storage of packaged dangerous goods

10.11 Factors controlling storage areas
10.12 Stacking of dangerous goods in freight containers
10.13 Dangerous goods operations
10.14 Segregation table in port areas
10.15 Emergency Response Organizations
10.16 Contingency planning
10.17 Examples of the systems of controlling dangerous goods in the ports of Hamburg and Rotterdam

11 DANGEROUS GOODS MANAGEMENT WITHIN A SHIPPING COMPANY
(2 hours)

11.1 The need for special dangerous goods departments within shipping companies
11.2 The role of the dangerous goods department
11.3 Some criteria to be checked by the dangerous goods department
11.4 Advisory services of the dangerous goods department
11.5 Safety considerations of the dangerous goods department
11.6 Documentation

12 THE MARINE POLLUTION ASPECT
(2 hours)

12.1 The International Convention for the Prevention of Pollution from Ships 73/78 (MARPOL 73/78) articles 2 to 8
12.2 Protocol I of the convention article I to V
12.3 Annex III of MARPOL 73/78, regulations 1 to 8
12.4 The new section 23 of the IMDG Code (Marine pollutants)

12.5 Pollution threat

12.6 Some typical examples of incidents involving dangerous cargoes

13 EMERGENCY PROCEDURES AND SAFETY PRECAUTIONS

(4 hours)

13.1 Recent developments in fire-fighting equipment and media

13.2 IMO Emergency Procedures for Ships Carrying Dangerous Goods

13.3 The emergency plan (EmS)

13.4 Measuring instruments for oxygen, flammable gases, and toxic vapour

13.5 Chapter II-2 of SOLAS 1974

14 SECURING OF DANGEROUS GOODS IN PACKAGED FORMS

(10 hours)

14.1 Definitions

14.2 Forces acting on the cargo during a sea-passage

14.3 Behaviour of cargo

14.4 Criteria for estimating the risk of an accident

14.5 Principles of safe stowage and securing of cargo

14.6 Cargo securing calculations

14.7 Standarized stowage and securing system (container ship)

14.8 Recommendations on lashing security for a ship carrying dangerous goods

15 ACCIDENT INVESTIGATION

(4 hours)

15.1 Types of investigations

15.2 Safety investigation

15.3 Goals of accident investigation process

15.4 Overview of the investigation process

15.5 Guidelines for reporting incidents involving dangerous goods in packaged form MSC/Circ. 360/Rev.1 of October 28, 1986

16 MEDICAL FIRST AID GUIDE FOR THE USE IN ACCIDENTS INVOLVING DANGEROUS GOODS (MFAG)

(4 hours)

16.1 Medical advice relating to the dangers of the carriage of chemicals by ships

16.2 Diagnosis of poisoning

16.3 The complications of poisoning

16.4 The circulatory system

16.5 The nervous system

16.6 The digestive system

16.7 General toxic hazards

16.8 Emergency treatment

16.9 Medical First Aid Guide For the Use in Accidents Involving Dangerous Goods (MFAG)

16.10 The International Medical Guide for Ships (IMGS)

17 THE ROLE OF ADMINISTRATIONS AND COMPETENT AUTHORITIES
(2 hours)

17.1 The role and duties of the Administration
17.2 The role and duties of the competent authorities
17.3 Overview of section 22 of the General Introduction of the IMDG Code
17.4 The various possibilities and practices of implementing the IMDG Code

18 CASE STUDIES
(6 hours)

18.1 Presentation of some major accidents involving dangerous goods
18.2 Presentation of the accident on December 31, 1979, involving the tug boat SENTINEL towing general cargo barges, the KONA and the AGATTKU, due to the failure of a towing cable
18.3 Presentation of the collision of PANAMA CITY butan barge with M/V INCA TUPAC YUPANQUI on August 30, 1979
18.4 Discuesion, conclusions and recommendations

19 TRAINING
(2 hours)

19.1 The role of the IMO in maritime training and education
19.2 On board training
19.3 Port training
19.4 Self study courses

TIMETABLE

DAY WEEK I	LESSON 1-2 08.30-10.00	LESSON 3-4 10.20-11.50	LESSON 5-6 12.45-14.15	LESSON 7-8 14.30-16.00
1	Introduction	Basic science	Regulations	Case studies
2	Basic science	Regulations	Securing	Documentation
3	Basic science	Classifi-cation	Health hazards	Securing
4	Basic science	Securing	Medical First aid	Admini-stration
5	Classifi-cation	Identifi-cation	Emergency procedure	Securing
DAY WEEK II				
1	Packing	D.G. in Shipping Cos	Emergency procedures	Identi-
2	Packing	Securing	Medical First aid	Visit to hospital
3	Handling, stowage	D.G. in port areas	Pollution aspect	Accident investigat.
4	Handling, stowage	D.G. in port areas	Accident investigation	Case studies
5	Examination	Training	Visit to port	

Final day at 19.00-20.30 a reception will be held where the certificates will be distributed and the questionaires will be answered

PART III

COURSE DESCRIPTION

COURSE DESCRIPTION

1 INTRODUCTION

Objectives:

To give the participants an insight to the course contents, to make them familiar with the course material and to outline the importance of training.

Lecturers' qualifications:

Senior lecturers, master mariners with MSc degree and experience in dangerous goods transport operations.

Training Aids:

Transparencies, slides, handouts, manuals, advertising material, industry brochures, posters, films, videos.

1 Course description:

1.1 Presentation of the course:

- Introduction of lecturers
- Introduction of the subjects in the course
- Description of the course objectives
- Presentation of systematic study

1.2 Categories of senior personnel involved in and responsible for dangerous goods transport operations:

- Administrators at all levels (technical advisors, senior officers)
- Port authorities (harbour masters, pilots, senior officers of cargo section and traffic control)
- Port users (carriers, forwarders, agents, masters,

deck officers, port captains, senior officers responsible for shipping department)

- Training institutions (professors, lecturers)
- Shippers/consignors (senior officers responsible for shipping)
- Marine and cargo surveyors and ship inspectors
- Warehousing personnel (supervisors of storage areas)
- Safety and security bodies (emergency response senior staff)
- Coast guard (senior officers)
- Fire brigade (senior officers)
- Packaging industry (senior officers)
- Manufacturers of dangerous goods (senior officers)

1.3 Historical background of dangerous goods transport operations:

- Technology and its effects on the chemical industry
- The report of the UN Committee of Experts on the Transport of Dangerous Goods
- The development of the IMDG Code

1.4 The transport of dangerous cargoes by sea as a link in the chain of multimodal transport operations

- Types of ships carrying dangerous cargoes
- Multimodal transport operations

1.5 The need and importance of training

2 BASIC SCIENCE INCLUDING INTRINSIC HAZARDS AND RISKS OF SUBSTANCES

Objectives:

To give the participants a knowledge of the elementaries of chemistry and physics. To enable them to understand the properties and characteristics of dangerous goods cargoes

and to enable them to identify the chemical reactions between different substances, materials, and articles which may be offered for transport.

Lecturers' qualifications:

MSc or BSc in physics and chemistry with experience in the field of dangerous goods transport operations.

Training aids:

Slides, transparencies, films, laboratory demonstrations, etc.

Course description:

2.1 Elementary physics:

- States of aggregation
- Liquids
- Hydrostatic pressure
- Vapour
- Vapour pressure
- Gas and vapour
- Shifting of cargo
- Diffusion of liquids and gases

2.2 Organic chemistry:

- Elements, atoms, molecules and compounds
- Alkanes, alkenes, and alkynes
- Aromatics, hydrocarbons
- Chemical families by active groups
- Systematic names (nomenclature)
- Chemical reactivity/stability
- Reactivity with oxygen and water
- Self-reactivity and decomposition
- Polymerization

- Inhibition
- Physical states: solids, liquids and gases.
- Boiling point
- Saturated vapour pressure/variation with temperature
- Influence of pressure on boiling point
- Latent heat and evaporation
- Solubility
- Density and relative density
- Expansivity
- Binary compatibility by reactive group
- Compatibility of chemicals with the materials of containment

2.3 Radioactivity

2.4 Combustion:

- Flashpoint
- Flammable range
- Upper and lower flammable limits
- Effect of oxygen on flammable range
- Relationship between flashpoint and lower flammable limits

2.5 Explosions:

- Propellants
- Detonators
- High explosives
- Brisant

2.5.1 Potential hazards:

- Characteristics and hazards of the IMDG classes
- Materials Hazardous Only in Bulk (MHBs)

2.5.2 Sources of ignition:

- Smoking
- Heat transfer

- Electrical equipment
- Spontaneous combustion
- Auto-ignition temperature
- Static electricity

2.5.3 Spillage of hazardous substances:

- Vapour clouds and dispersion
- Dangers from vapour cloud drift
- Effect of weather conditions

Texts and references:

- Course handout
- Lange's Handbook of Chemistry by N.A. Lange
  Publisher Mc Graw-Hil
- Chemical principles by W.L Slowinsky-E.J Saunders
  Publisher Masterton
- Handbook of chemistry by R.C Weast Publisher Chemical
  Rubber Publishing Co
- United Nations Transport of Dangerous Goods (Orange Book)

3 HEALTH HAZARDS:

Objectives:

To give the participants a knowledge of the hazards of dangerous goods affecting human health. To enable them to avoid such hazards and to apply the IMO Emergency Schedules Procedures in case of an accident involving dangerous substances and to enable them to use the IMO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG).

Lecturers' qualifications:

PhD or MSc in medical science with sufficient experience

on the treatment of dangerous goods.

Training aids:

Transparencies, slides, films, field trip to hospital.

Course description:

3.1 Toxicity

- Toxic properties of products
- Poisons and irritants
- Acute and chronic effects of toxicity
- Threshold Limit Value (TLV.STEL)
- Time Weighted Average (TWA)
- Oral intake and skin absorbtion
- Inhalation, oxygen deficiency
- Narcosis
- Shipboard medicine chest for poison treatment
- First aid and resuscitaion
- Radio for medical advice
- Hazard data sheets and other sources of information

3.2 The IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods

Texts and references:

- Course handout
- Lange's Handbook of Chemistry by N.A. Lange Publisher Mc Graw-Hil
- Chemical principles by W.L Slowinsky-E.J Saunders Publisher Masterton
- Handbook of chemistry by R.C Weast Publisher Chemical Rubber Publishing Co
- United Nations Transport of Dangerous Goods (Orange Book)
- Medical First Aid Guide for Use in Accidents involving

Dangerous Goods (MFAG) by IMO/ILO/WHO Publisher IMO

4 REGULATIONS, REQUIREMENTS, RECOMMENDATIONS AND CODES OF SAFE PRACTICE

Objectives:

To give the participants information and, when required, knowledge about the most important instruments containing relevant regulations and practices. To enable them to implement the regulations and to make them aware of the sources of information they may require.

Lecturers' qualifications:

Master mariner with experience in dangerous goods transport operations.

Training aids:

Handouts from relevant publications, transparancies, slides, films, posters.

Course description:

4.1 The International Convention for the Safety of Life at Sea 1974 (SOLAS) as amended in 1981 and 1983:
- Chapter VII, part A, general view on regulations 1 to 7
- Chapters I and II

4.2 RID/ADR - The European Conventions for the Transport of Dangerous Goods by Rail/Road
- General view on the Conventions
- Highlights on major points

4.3 The United Kingdom "Blue Book"
- General overview on the "Blue Book"

- General information on the UK system:
  * Status
  * Benefits
  * Functions

4.4 The United Nations Recommendations on the Transport of Dangerous Goods - The "Orange Book"
- UN classification, labelling and marking, UN number, packing, methods of testing, correct technical name, shipping papers, stowage and segregation

4.5 UN Committee of Experts on the Transport of Dangerous Goods:
- Establishing of the Committee of Experts
- The tasks of the Committee of Experts
- The Committee's recommendations

4.6 The IAEA Regulations for the Safe Transport of Radioactive Material 1985 and 1986 Supplement
- General view on the regulations

4.7 The International Maritime Organization (IMO) in the United Nations System with particular emphasis on the carriage of dangerous goods.
- The regulatory aspects of IMO within the UN system
- The main duties of IMO
- The structure of IMO
- Member countries of IMO

4.8 The IMO Subcommittee on the Carriage of Dangerous Goods
- Duties of the Sub-Committee
- The structure of the Sub-Committee
- Functions of the Sub-Committee

4.9 The International Maritime Dangerous Goods (IMDG) Code, its Annex I (packing recommendations) and Supplements (the EmS and the MFAG)

introduction sections concerning:

- The proper way to use the code
- Some practical examples of different classifications
- How to obtain the required information about the substances
  * Proper shipping name (correct technical name)
  * UN Number
  * Class
  * Packing
  * Segregation
  * Stowage
  * Emergency response procedures
  * Annex I, packing recommendations
  * General view on the IMDG Code Supplements EmS - MFAG Guide

4.10 The Code of Safe Practice for Solid Bulk Cargoes (BC Code):

- Its aims
- General view on the Code and Appendix B thereof
- Materials possessing chemical hazards and MHBs

Texts and references:

- The International Convention for the Safety of Life at Sea 1974, SOLAS 1974, as amended - chapters I, II and VII
- United Kingdom "Blue Book"
- United Nations Recommendations of the Transport of Dangerous Goods "Orange Book"
- The IAEA Regulations to the Transport of Radioactive Materials 1985 and 1986 Supplement
- Rid/ADR - The European Conventions for the Transport of Dangerous Goods by Rail/Road

- The International Maritime Dangerous Goods, IMDG Code: its Annex I and supplements (Ems and MFAG)
- The Code of Safe Practice for Solid Bulk Cargoes

5 Classification:

Objectives:

To familirize the participants with the classification and grouping criteria employed in the Orange Book and the IMDG Code. To establish a basis for identifying those chemicals or products which fall under the relevant transport regulations.

Lecturers' qualifications:

Master mariner with MSc degree and experience in the field of dangerous goods transport operations.

Training aids:

Transparencies, slides, the IMDG Code, film.
(Film: Basic fire chemistry)

Course description:

5.1 The UN classification system:
- IMDG Code classes 1 to 9, with description for each class (section 5 of the Code)
- Purposes of classification
- The assessment of hazards of substances
- State of dangerous substances

5.2 Definitions:
- Flashpoint
- Flammable range
- Vapour density

- Explosive substances
- Pyrotechnic substances
- Explosive articles
- Flammable/inflammable
- Material Hazardous Only in Bulk (MHB)
- Toxic
- Boiling point
- Critical temperature
- Reid vapour pressure

5.3 Classification criteria of dangerous goods transport in packages:

- Packaging groups according to the degree of danger they present for all classes other than classes 1, 2, 6.2, and 7
- The packaging marks (X, Y or Z)
- Criteria for class 1 - Explosives:
  * Classification code table
  * Scheme of classification of exlosives, combination of hazard division with compatibility group
- Criteria for class 2 - Gases compressed, liquefied or dissolved under pressure:
  * (a) permanent gases
    (b) liquefied gases
    (c) dissolved gases
    (d) deeply refrigerated gases
  * Subdivided for stowage and segregation purposes:
    Class 2.1 - Flammable gases
    Class 2.2 - Inflammable gases
    Class 2.3 - Poisonous gases
  * Two diverging sets of criteria:
    (a) Substance exerting an absolute pressure exceeding

- 2.8 Kg/cm² at 21.1 C° or
- 7.3 Kg/cm² at 54.4 C°

(b) Substance exerting a reid vapour pressure exceeding 2.8 Kg/cm² at 34.8 C°

- Classification and grouping criteria for class 3 - Flammable liquids
  * Packaging groups according to degree of danger I, II, III
  * Packaging group of a flammable liquid not listed by name in the IMDG Code
    - Table showing the relationship existing between two of the three characteristics; flashpoint and viscosity
    - Determination of grouping of flammable viscous substances with flashpoint less than 23°C c.c
    - The conditions under which the flammable viscous substances with flashpoint less than 23°C c.c are included in packaging group III
- Criteria for classes 4.1, 4.2, 4.3 and 5.1 by the UN Committee of Experts on the Transport of Dangerous Goods in December 1986
- Criteria for class 5.2 - Organic peroxides:
  * Specific properties of organic peroxides only those listed in the IMDG Code
  * Organic peroxides not listed by name
  * The three N.O.S Entries in the IMDG Code
- Criteria for class 6 - Poisonous and infectious substances:
  * Properites
  * Packing
  * Grouping criteria for administration through dermal contact and inhalation of dusts and mists table

Definitions:

-LD 50 for acute oral toxicity

-LD 50 for acute dermal toxicity

-LD 50 for acute toxicity and inhalation

-Classification list of pesticides

-Pesticides table

- Criteria for class 6.2 - Infectious substances:
  * Substances causing disease in humans or animals
  * Biological products and diagnostic specimens
  * Substances with flashpoint of 61 C° or below
- Criteria for class 7 - Radioactive materials
  * Hazards from radioactive materials
  * Action
  * Procedure to be followed when a person is contaminated by radioactive material
  * Radio for Medical Advice
  * Introductory notes/emergency procedures
- Criteria for class 8 - Corrosive substances
  * Categories of packaging groups for class 8
  * Animal test
  * Criteria of substances lying falling under N.O.S schedule
- Criteria for class 9 - Miscellaneous dangerous substances
  * Data sheet

5.4 Classification of substances, materials, or articles with multiple hazards:

- Table of precedence of hazards for class 3, 6.1 and 8, class and packing group
  * Close cup method
  * Open cup method
- N.O.S (Not otherwise specified)

- Substances that have more than one hazard

5.5 Classification of solutions and mixtures:

- General information
- Pure substances
- Using the word "mixtures"

5.6 Data sheet for dangerous substances:

- Substances' identity
- Proposed classification
- Physical properties
  * Melting point or range C°
  * Boiling point or range C°
  * Relative density at 15 C°, 20 C°, 50 C°
  * Vapour pressure at 50 C°, 65 C°
  * Solubility in water at 20 C°
  * Viscosity at 20 C°
- Chemical reactions:
  * Does the substance require inhibition/stabilization?
  * Alternative methods
  * Time effect at 55 C°
  * Does the substance react with water?
  * Does the substance have oxidizing properties?
  * Is the substance an isorganic peroxide?
  * Is the substance corrosive?
- Harmful biological effects:
  * 50 LD, oral mg/kg animal species
  * 50 LD, inhalation
  * Saturated vapour concentrated at 20 C°
  * Skin exposure
  * Human experience
- Supplementary information:
  * Fire

* Spillage
* Proposed transportation mode

- Intermediate bulk containers
- Multimodal tank transport

5.7 Packaging groups according to the degree of danger

- Group I, II, III according to the degree of danger

6 PACKING

Objectives:

To give the participants knowledge of the types of packagings. To enable them to identify the proper packaging for each substance, material or article and to be aware of the regulation requirements concerning packing.

Lecturers' qualifications:

Master mariner or senior officer from the industry with experience in the packing of dangerous goods.

Training aids:

Transparencies, slides, films.
(Film: Tank container fire test)

Course description:

6.1 Regulation 3 of chapter VII of SOLAS 1974:
Explanation of each point from 1 to 5 including the subpoint

6.2 General view of section 10 of the IMDG Code

- Examples on how to use the IMDG Code in order to obtain the assigned group for some substances
- Performance tests

6.3 Dangerous goods in limited quantity and mixed

packing (revised section 18 of the IMDG Code):

- Table of the quantity limitations as specified in subsection 18.3
- Substances that do not qualify for limitation
- Inner and outer packagings
- Segregation - Proper shipping name

6.4 Grandfather clause:

- Philosophy
- The transitional period

6.5 Eqivalences:

- The use of tested packagings different from those recommended in the IMDG Code

6.6 Glossary of packaging:

- Type and materiale used in packing
- Table of types and codes of packagings

6.7 Packing provisions for the substances and articles in the various classes of the IMDG Code

6.8 Unit loads, vehicles, trailers in purpose built cargo ship:

- Definition of unit load
- The main packing requirements of subsection 10.18
- Safe handling
- Shape of packaging and its suitability for stacking
- Strength of the package according to the height of stacking
- Inspection of cargo transport units
- Materials used to bond the unit load
- Bulk packaging
- MHBs in cargo transport unit
- Dangerous goods on float beds

6.9 Freight containers:

- Definitions: Freight container - Closed container -

Open container

- Container packing certificate
- Provision of article V, paragraph 2 of CSC 1972, convention concerning structural safety requirements
- Special container for certain dangerous goods
- After unpacking of the container:
  * Old lables should be removed or masked
  * No contamination likely to make the container dangerous

6.10 Portable tanks and road tank vehicles:

- Definitions: Portable tanks - Road tank vehicles
- The 8 IMO types of portable tanks
- The requirements of section 13 of the IMDG Code
- The requirements of CSC 1972, as amended

7 IDENTIFICATION, MARKING, LABELLING AND PLACARDING

Objectives:

To give the participants knowledge of identification, marking, labelling and placarding and the necessary regulations controlling the matters. To enable them to identify the labels of each class and to fulfil the regulation requirements.

Lecturers' qualifications:

Master mariner with experience in dangerous goods transport operations.

Training aids:

Transparencies, slides, handouts.

Course description:

7.1 Identification:

- UN number
- Proper shipping name
- Purpose of indicating proper shipping name
- Using of capital letters
- Single or plural shipping name
- Examples illustrating the selection of proper shipping name
- Packagings marked "N.O.S." for substances which are not listed on any schedule
- Examples illustrating the selection of proper shipping name for such "N.O.S."

7.2 Marking:

- The method of marking the proper shipping name should be such as the information will still be identible on packages surviving at least three months immersion in the sea. Lecturer will establish a discussion about the subject

7.3 Labelling:

- Specification of labels; colours, symbols, classes, numbers, dimensions
- Illustration to the labelling system
- Regulations of dangerous goods with low degree of hazard when in large shipment (as a unit load)
- Dangerous goods in container should be labelled with subsidary risk labels "X"

7.4 Placarding of cargo transport units:

- Regulation controlling the display of placards on unit loads
- Information required to be written on the placards
- Subsidary risk placards

- Removal of placards from empty containers
- The importance of displaying placards upon emty uncleaned containers

Texts and references:

- Sections 7 and 8 of the IMDG code
- Handout

8 TRANSPORT DOCUMENTATION (CERTIFICATION AND DECLARATIONS)

Objectives:

To give the participants information of the documents required when dangerous goods is transported by sea. To let them know the documentation required by the IMDG Code and to make them able to complete the forms in the proper way.

Lecturers' qualifications:

Master mariner, senior officer from the Customs, or any qualified and experienced personnel from the shipping industry (agents - forwarder - shipper).

Training aids:

Transparencies, slides, text of the documentation.

Course description:

8.1 The Convention on Facilitation of the International Maritime Traffic 1965

- Purposes of the convention
- Documentations required by the convention
- The eight forms with copies of the six documents

developed by the IMO

Benefits of the convention:

- General benefits
- Benefits of governments
- Shippers' benefits
- Shipowners' benefits

8.2 Regulation 5 of chapter VII of the International Convention for the Safety of Life at Sea (SOLAS 1974) as amended

1 Correct technical name

2 Dangerous goods declaration

3 Dangerous goods special manifest - Stowage plan - ECE aligned document for transport of dangerous goods

8.3 Documentary aspects of the international transport of dangerous goods:

- The recommendation divided into two parts: Information and documents requirements
- Information requirements

8.4 Documentation:

- Role of documents in the international transport of dangerous goods

8.5 Main points in the declaration text:

- The identity of the goods: Packing - Marking - Labelling
- Packaging approval
- Goods description
- Liability and correct information
- Signature

8.6 Main data elements of the declaration:

- Data elements required due to the nature of the danger
- Hazard class/division

- UN number
- Flashpoint
- Net quantity of substance
- Dated and signed declaration

Other data required:

- Shipper (name and adress)
- Reference number
- Name of ship and name of port
- Marks
- Number of package
- Description of goods

8.7 The different transport documents

8.7.1 Multimodal and combined transports:

- Purpose
- Documentory problems
- CMR consignment note

8.7.2 Certificate of fitness for the carriage of dangerous goods (SOLAS 1974 as amended) Regulation 54(3) of chapter II of the amendments of SoLAS 1974

8.7.3 Bulk coal cargo declaration

8.7.4 Container/vehicle declaration packing certificate

Text and references:

- SOLAS 1974 chapter VII, regulation 5
- The Convention on faciliation of International Maritime Traffic 1965
- IMDG Code, sections 7 and 9
- Handout of dangerous goods course "WMU"
- Resolution 55 (XI) for UNCTAD Report of the Committee on Shipping on its' 11th session

9 HANDLING STOWAGE/STORAGE AND SEGREGATION

Objectives:

To give the participants knowledge of segregation, stowage, and handling of dangerous goods. To enable them to prepare a cargo plan bearing in mind the segregation requirements for dangerous goods. To enable them to supervise the handling of the cargo in order to ensure the fulfillment of safety requirements.

Lecturers' qualifications:

Master mariner with experience in the carriage of dangerous goods or port captain, stevedoring supervisor.

Training aids:

Transparencies, slides, handouts, films.

Course description:

9.1 General regulations and requirements

Definitions for segregation terms in general:

- Away from
- Separated from
- Separated from by complete compartment
- Separated longitudinally by intervening compartment
- Segregation, if any, is given in the schedule for for a substance or article

9.2 Stowage

9.2.1 Passengership limitations

9.2.2 Definitions:

- Under deck
- On deck
- On deck only
- Shaded from radiant heat

9.3 The importance of safe handling - stowage/storage
- Stowage according to individual schedule for each substance
- Minimum stacking height in accordance with Annex I

9.4 Stand by requirements when handling certain dangerous cargoes

9.5 Preparations and procedures of the safe handling of handling operations

9.6 Purposes of segregation:
- Effects of explosives
- Effects of flammable liquids
- Effects of flammable substances
- Substances that react dangerously with water
- Infectious substances and contamination problems
- Reactions of corrosive and oxidizing agents

9.7 The main activities that must be carries out in ships carrying dangerous goods:
- General maintenance of the ship
- Lashing and securing
- Cleaning of cargo space
- Supervision of handling operation
- Supervision of stowage and segregation

9.8 Overview of new section 14.8 of the General Introduction to the IMDG Code:
- Stowage in relation to foodstuffs
- Poisonus substances that should be "separated from" foodstuffs
- Corrosive and toxic substances that should be

stowed "away from" foodstuffs

9.9 The general segregation table:

- The use of the table in order to obtain the general requirements for segregation methods between classes. (IMDG Code segregation table in force since January 1, 1985)

9.10 Segregation terms, exercises on the terms and the use of segregation table:

- Deck resistant to fire and liquid
- Closed transport unit
- Hold
- Shelter between deck
- Reference package
- Package containing incompatible goods

9.11 Section 15 of the IMDG Code

- Provisions of the paragraphs 15.1.6 to 15.1.16
- Segregation of packages:
- Away from
- Separated from
- Separated by a complete compartment or hold
- Separated longitudinaly by an intervening complete compartment

9.12 Segregation of container on board container ship:

- Definition of freight containers space
- Table of segregation of container on board container ships

9.13 Segregation of cargo transport units on board Ro/Ro ships:

- Table of segregation of transport units on board Ro/Ro ships
- Applicability (paragraphs 15.4.1.1-15.4.1.2-15.4.1.2.1)

9.14 Segregation on board-barge carrying ships:
- Applicability
- Segregation in shipborne barges
- Segregation between shipborne barges on barge carrying ships

9.15 Dangerous cargoes in bulk packaging
- New section 25 of the general introduction

9.16 Dangerous and hazardous cargoes in solid form in bulk
- Definitions and terminology
- New section 24 of the general introduction to the IMDG Code
- Part A of chapter VII SOLAS 1974 as amended and chapter II-2, regulation 54
- The Code of Practice for Solid Bulk (BC Code)
- Special requirements for classified cargoes

Texts and references:

- IMDG Code, sections 12,13,14 and 15
- SOLAS 1974 amended regulation 54(3) of chapter II of the amendments of SOLAS 1974

10 DANGEROUS GOODS IN PORT AREAS

Objectives:

To give the participants knowledge of port operation and legislation. To enable them to understand the international regulations and recommendations concerning the port. To enable them to identify the main factors that should be included in the port regulations in order achieve the safety requirements and to facilitate port operations involving packaged dangerous goods.

Lecturers' qualifications:

Master mariner with experience, harbour master, port captain or senior personnel from stevedoring companies.

Training aids:

Transparencies, slides, films. Field trip to port area.

Course description:

10.1 The position of the port:
- Definition of the port
- Identification of the problems of the port
- The difference between ports of industrialized countries and ports of developing countries
- The technology and its influencec on the port design
- Conclusion

10.2 Available facilities in ports:
- Skilled personnel
- Information system
- Equipment of the port and its operation
- Conclusion.

10.3 Port legislation (dangerous substances):
- The relationship between safety and economics of the port
- Establishing of the legislative framework
- Influences of the international regulations on port legislation
- Discussion

10.4 Administration
- Information streams:
  * From the outside (shipper/carrier)
  * Within the port and outgoing information (to

carrier/consignee)

* Information to the safety authority emergency organization

- Information contents:

* IMOs' Recommendations for the Safe Transport, Handling, Stowage of Dangerous Substances in Port Areas and its supplement

10.5 Systems of transformation of information:

- Computerization
- Steaking card
- Paper file

10.6 Documentation:

- The documentation delivered from the ship (Shipping paper as recommended in the IMDG Code)
- The port safety division and its duties

10.7 Acceptance of packaged dangerous goods:

- Main factors controlling the acceptance of dangerous goods
- Ships that carry dangerous goods to port
- Rejection of damaged dangerous goods (by land or sea transport)

10.8 Categorization of dangerous goods in port areas for handling and storage purposes:

- Dangerous goods that are unacceptable
- Acceptance of some highly dangerous goods at special loading/discharging areas only
- Other dangerous goods that can be handled at an ordinary pier
- The remaining dangerous goods that can be stored inside the port

10.9 Quantity limitations

- Example Port of Hamburg tabel of limitations

10.10 Storage of packaged dangerous goods:

- Types of storage areas:
  * Open air area
  * Warehouses
  * In cargo transport unit
  * Waiting area
  * Prohibited area

10.11 Factors controlling storage areas:

- Type of goods
- Amount of goods
- Size of the port
- Climate
- Training of the port personnel
- Port facilities
- Bomb theory
- IMDG Code segregation table in port area
- Storage of class 1 and class 7

10.12 Stacking of dangerous goods in freight containers:

- Methods of stacking
- Precautions necessary for stowage of class 1 and 7

10.13 Dangerous goods operations:

- General view on (ILO) recommendation 160, code of safe practice
- General view on (IMO) port recommendation MSC/ circ 200 as amended in 1983
- Argument of loading/discharging of dangerous goods while ship lies at anchor
- Skilled operation supervisor
- Training of dockworkers
- Safety operation equipment and its use
- Hazard diamond placarding system

10.14 Segregation table in port areas:

- Examples of the use of the segregation table
- Definitions:
  1 3 metres distance
  2 10 metres distance
  3 30 metres distance
  X General segregation required; individual schedules should be consulted

10.15 Emergency Response Organizations

10.16 Contingency planning

10.17 Examples of the systems of controlling dangerous goods in the Port of Hamburg and the Port of Rotterdam (Rotterdam symposium 1987)

Port of Hamburg:

- Who is the competent authority responsible for dangerous goods?
- National resolutions that are similar to the IMDG Code RID and ADR

Port regulations:

View on the most important national regulations:

1 Reporting system
2 Handling regulations
3 Identification of dangerous goods
4 Gangway placard
5 Quantity limitations for some classes
6 Accident reporting regulations
7 Safety regulations concerning fire

- Water police duties
- Implementation of the port regulations
- The controlling system (stowage, segregation, handling)

Port of Rotterdam:

The study of the renewal of the safety aspects in

the Port of Rotterdam (by Rotterdam Port Authority and Environmental Control Agency).

The reasons that lead to the study:

- Increase in the amount of dangerous goods passing through the Port of Rotterdam (table I and II)
- Proximity of resdential quarters to the harbour

The regulatory aspects of the Port of Rotterdam:

- Rules of Rotterdam Port Authority
- Nuisance act and the area of port activities covered
- Transhipment of materials
- Movements of ships
- Handling and storage of cargo
- Activities during transhipment from ship to pier

How was the study done?

- Analysis of statistics
- Determination of major classes of transhipment
- Analysis of accidents
- Construction of physical models for release of liquids through holes
- Recommendation of the calculation results with physical models
- Amendments to the regulations

Discussion

Scientific methods that must be used in order to identify the problem

Texts and references:

- Chapter I of the present thesis, section 9 of the General Introduction to the IMDG Code
- Recommendation 160 of ILO Convention 152
- IMO Recommendations on the safe transport, handling and storage of dangerous goods in port areas

11 DANGEROUS GOODS MANAGEMENT WITHIN SHIPPING COMPANIES

Objectives:

To describe the shipping companies system of managing dangerous goods. To give the participants knowledge of the system. To provide a forum for open discussion about the system.

Lecturers' qualifications:

Master mariner with experience in the carriage of dangerous goods, head of dangerous goods section in shipping company or dangerous goods inspector.

Training aids:

Transparencies, slides, films.

Course description:

11.1 The need for special dangerous goods department within shipping companies

- Some statistics on the amount of dangerous goods carried by sea
- Some statistics on the increase in dangerous goods transport
- Bad management in shipping companies and its influence on accidents involving dangerous goods

11.2 The role of the dangerous goods department:

- Philosophy of a dangerous goods department
- The procedures of the system:
  - Booking
  - Checking (technical name, packing, stowage, and segregation according to the IMDG Code

regulations and company rules)

- Assigning of the Emergency Schedule Number (EmS No) and MFAG
- Booking of the acceptance telex
- Summarizing of dangerous goods booking
- Summarizing of the classes
- The use of computers for checking

11.3 Some criteria to be checked by the department:

- Suitability of the ship to carry the relevant dangerous goods
- Quantity limitation announced by authorities of transit ports
- Permission from any way port
- Documentation required
- Laws and regulations compulsory for such shipment

11.4 Advisory service of the dangerous goods department:

- Advise on the appropriate stuffing of the container
- To give the tonnage centre summary for dangerous goods accepted
- To check the stowage plan prepared by the stowage centre
- To check and inspect the stuffing of the container
- To prepare the inspection report

11.5 Safety consideration of the dangerous goods department:

- Container checking for dryness, cleanliness, removal of old placards, proper assignment of new placards, suitability of packages for dangerous goods.
- Container stowage
- Segregation and mutually compatible goods

11.6 Documentation:

- Dangerous goods list
- Cargo manifest
- Container packing certificate, vehicle and tank container
- Dangerous goods declaration
- Dock receipt
- Others

Texts and references:

- Chapter I of the present thesis, section 5
- Shipping companies policies

Discussions with the participants have a very important effect on the subject since the participants have both the theoretical background and practical experience in the subject. The sharing of experiences and opinions will thus be a valuable learning experience.

12 THE MARINE POLLUTION ASPECT

Objectives:

To give the participants information of the regulations concerning pollution prevention by harmful substances. To enable them to understand regulations covering ship/shore requirements and duties.

Lecturers' qualifications:

Master mariner with experience in dangerous goods. Harbour master. Senior personnel of emergency organizations.

Training aids:

Transparencies, slides, films.

Course description:

12.1 The International Convention for the Prevention of Pollution from ships (MARPOL 73/78) articles 2 to 8, protocol I, articles I, II, III, IV and V

12.1.1 Article 2, definition:

- Regulations
- Harmful substances
- Discharge
- Ship administration
- Incidents
- Organization

12.1.2 Article 3, application:

Applies to:

- Ships flying the flags of parties to MARPOL
- Ships flying the flags of nations not party to MARPOL but operating under authority of a party

Does not apply to:

- War ships
- Noncommercial ships

12.1.3 Article 4, violation:

- Penalties or other actions against violations taker by Administrative Jurisdiction or furnished to the administration of the ship
  Explanation of the system of penalties according to Aticle 3 and of the system of informing IMO and the other party administration

12.1.4 Article 5, certificates and special rules on inspection of the ship:

- Ship pollution prevention certificate
- Conditions for detaining the ship
- Denying the entrance of foreign ship to the port

- Ships of non-parties

12.1.5 Article 6, detection of violations and enforcement of the convention:

- Measures of detection and environmental monitoring
- Inspection of parties' ships by authorized office in order to verify whether the ship has discharged harmful substances
- Inspection of parties' ships when entering a port under its jurisdiction if a request for an investigation is received from any party together with sufficient evidence (discharging of harmful substances)

12.1.6 Article 7, undue delay of ship:

- Avoidance of undue detention
- Compensation for any loss due to undue detention or delay

12.1.7 Article 8, report or incidents involving harmful substances. Reporting system for incident:

- Reporting officer for receiving and processing incident reports
- Notification of IMO - by all parties concerned
- Monitoring system and incident inspection

12.2 Protocol I of the convention article I to V:

12.2.1 Article I, duty to report:

- The master of a ship involved in an incident with pollution must report immediately to the administration where the accident occured. If he is unable to do this the administration, owners and agents should fulfil that requirement.

12.2.2 Article II, methods of reporting:

- Radio message or telex to reporting officer in

charge

12.2.3 Article III, when to make reports:

- A discharge other than as permitted
- A discharge as permitted for the purposes of combating specific pollution
- Securing the safety of ship as a result of damage to a ship or equipment

12.2.4 Article IV, contents of report:

- Ship's identity
- Time and date
- Position
- Ship's condition
- Technical name for substance
- Quantities
- Packaging form
- Name of consigner
- Consignee
- Manufacturer

12.2.5 Article V, supplementary report:

- Reporting of any information concerning the incident
- Cooperation with all staff affected by the incident

12.3 Annex III MARPOL 73/78 regulations 1 to 8:

12.3.1 Regulation 1, Application:

- The government of each party shall issue detailed requirements for packaging, marking, labeling, documentation, stowage, quantity limitations, exceptions and notification, in order to prevent or minimize pollution
- Empty receptacles shall be treated as harmful substances

12.3.2 Regulation 2, Packaging:

- The packagings shall be adequate to minimize the hazard to marine environment

12.3.3 Regulation 3, Marking and labeling:

- Packages either shipped individually or in units, shall be durably marked with the correct technical name and a distinctive label (UN number)

12.3.4 Regulation 4, Documentation:

- Documentation according to the IMDG Code requirements as mentioned in subject 7 of this course

12.3.5 Regulation 5, Stowage:

- Stowage should fulfil the requirements of SOLAS 1974 as amended and of the IMDG Code in order to minimize the hazards to the marine environment

12.3.6 Regulation 6, Quantity limitations:

- The need of prohibition of certain harmful substances or limitation of the quantity according to the IMDG Code requirements

12.3.7 Regulation 7, Exceptions:

- Discharge by jettisoning is prohibited except where necessary for the purpose of safety for ship or for saving life at sea

12.3.9 Regulation 8, Notification:

- The master of the ship or the agent should notify the appropriate port authority of loading or discharging dangerous goods 24 hours prior to such operation

12.4 The new section 23 of the IMDG Code (Maritime pollutants):

- List of marine pollutants
- MEPC circular 5
- Reporting of incidents

12.5 Pollution threat:

- What are the packaged forms as defined in the "Orange book" which pose a hazard for marine environments?
- What are the marine pollutants?

12.6 Some typical examples of incidents involving dangerous cargoes:

- Incident of barrels containing toxic agricultural weed killer (Dinseb) washed overboard a Danish ship on Jan 13, 1984
- Incident of fishing craft "Mayur Sagar" on Dec 1, 1982
- Report on the coastline of the UK where in 1985 50% of washed packages contained dangerous goods
- Sinking of the M/V "Mont Louis" in the summer of 1984 involving a cargo of class "7", uranium hexafluoride

Discussion of the incidents and conclusion.

Texts and references:

- MARPOL 73/78 as amended Annex III
- MSC/Circ 360/Rev.1
- IMO Manual on Chemical Pollution

13 EMERGENCY PROCEDURES AND SAFETY PRECAUTIONS

Objectives:

To describe the fire-fighting systems and equipment to the participants. To enable them to prepare effective management of fire risk. To give them knowledge of the Ems and to make them able to design an emergency plan.

Lecturers' qualifications:

Master mariner or senior fire-brigade officer.

Training aids:

Transparancies, slides, films, some fire-fighting equipment.

Course description:

13.1 - Recent developments in fire-fighting equipment and media
- Halons, high-expansion foam, water fog, dry powders, dual agent techniques
- Fixed fire detection systems
- Fire-fighting installations
- Consideration of ship stability with regard to fire-fighting
- Problems occuring in a ship structure
- Strategy and tactics required in order to gain control of fire
- Organisation and training of the crew for ship-board fire-fighting and other emergencies

13.2 IMO Emergency Procedures for Ships Carrying Dangerous Goods (EmS):

13.2.1 EmS No and description of relevant substance:
- Special emergency equipment to be carried
- Emergency procedures
- Emergency action
- First aid - reference to the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods

13.3 The Emergency plan

13.4 Measuring instruments for oxygen, flammable gases and toxic vapour
- Entering a closed compartment
- Protective clothing
- Self-contained breathing apparatus, escape-breathing apparatus

13.5 Chapter II-2 of SOLAS 1974

Texts and references:

- Regulation 19 of SOLAS 1974 as amended, chapter II
- EmS book
- IMO recommendation on the safe transport, handling, and storage of dangerous goods in port areas
- Regulation 54 of SOLAS 1974 as amended, chapter II
- The ILO code of practice on safety and health in dockwork
- WMU notes written by Capt. Brunings "Emergency procedures on board ships and port areas"

14 SECURING OF DANGEROUS GOODS IN PACKAGED FORM

Objectives:

To give the participants knowledge about the different forces acting upon cargo and about cargo behaviour. To enable them to calculate the various forces and to chose the proper method to secure dangerous goods.

Lecturers' qualifications:

Master mariner with experience in the transport of dangerous goods and a good background in stability and securing of cargo calculations.

Training aids:

Transparencies, slides, film.

Course description:

14.1 Definitions:

cross-stowage, side-stowage, single-stowage, longitudinal securing device, transversal securing device

14.2 Forces acting on the cargo during a sea-passage:

- Eart's gravity
- Acceleration by motions of the ship
- Pressure of winds and gusts
- Impact or buoyancy by overcoming seas

14.3 Behaviour of cargo:

- Sliding
- Tipping
- Racking
- Collapsing
- Floating up

14.4 Criteria for estimating the risk of an accident:

- Properties and special features of cargo
- Type and location of stowage
- General stability of the ship
- Expected ship behaviour
- Expected weather conditions

14.5 Principles of safe stowage and securing of cargo:

- Distribution of cargo
- Load assumptions
- Strength of securing equipment
- Type of securing devices

14.6 Cargo securing calculations:

- Simple thumb rule

- Limitation of the use of common thumb rule

14.6.1 Advanced calculation method:

- Load assumption
- Load by acceleration
- Load by wind and sea
- Use of form-sheat
- Balance of forces and moments
- Safety factors
- Friction forces
- Examples of calculation

14.7 Standarized stowage and securing system: (container ship)

- Container types
- Container characteristics
- Basic calculation of container lashing force
- Container calculation on Ro/Ro ship

14.8 Recommendation or lashing security for a ship carrying dangerous goods

Texts and references:

- Regulation for the stowage and lashing of container aboard ships, July 73 & August 79, Germanisher Lloyd
- Arrangements for securing of cargo containers onboard ships, Det norske Veritas
- Ship-board control and lashing techniques M.J. Carter Cargo Systems
- Stevedoring analysis
- Ro/Ro lashing systems
- Adequate technology but a need to educate operators cargo systems. Jan 1979 .
- ISO regulations
- Securing methods and calculations by W.G. Capt. Caps.

WMU Malmö

15 ACCIDENT INVESTIGATION

Objectives:

To give the participants knowledge of the investigation process and methods of reporting an incident involving dangerous goods. To enable them to follow the reporting procedure and to carry out an investigation.

Lecturers' qualifications:

Senior qualified investigator from an insurance company, state department, or classification society, with sufficient experience in the field.

Training aids:

Transparencies, slides, case studies, films.

Course description:

15.1 Types of investigations:

- Safety investigation
- Violation of law (suspension & revocation) investigation
- Civil liability investigation
- Criminal investigation

15.2 Safety investigation:

- Neutral independent role of investigation
  * No operational responsibilities
  * No regulatory responsibilities
  * No promotional responsibilities
  * Completely separate from litigation
  * No adverse proceeding, no cross examination

15.3 Goals of accident investigation process:

- Protection of people from death and injury
- Protection of environment
- Protection of economical resources
- Raising of the publics' confidence in transportation
- Protection of the quality of life

15.4 Overview of the investigation process:

A Major activities consisting of investigating testimony, evidence, data analysis, comparison, devising, and solutions

- Testing, research, autopsies
- Time goals for each phase
- Selected issues during fact finding stage
- Obtaining of facts and making analysis of the accident

B Field phase

- Establishment of a notification system
- Organization of an investigation team
- Need for flexibility or adjustment to peculiarities of the accident
- Coordination with search and rescue personnel
- Identifying and insuring availability of witnesses
- Preseration of evidence
- Ensuring jurisdiction

Investigative party concept:

- Who may serve?
- Who may not serve?

C Functions of the ivestigative party system

Philosophy:

- Impossibility of having current experts in every field
- Financial benefit
- Gaining of supporters for the report and recommendations

Selection criteria:

- Weather
- Stability
- Human performance
- Survival
- Navigation
- Hull maintenance
- Communications

D Investigative equipment

- Cameras, type, film speeds documenting each exposure, systematic approach, composites
- Personal safety clothing
- Tape recorder
- Tape measure, flashlight, tags, markers, bags

E Investigator qualifications

- Naval architect
- Profesional ship masters, engineers

Training areas:

- Interviewing techniques
- Photography
- Safety standards of classification societies
- IMO, national standards, engineering societies

F Ensuring completion of fact finding phase

- Selecting relevant facts
- Looking ahead - comparison with current regulations
- Voluntary standards, established practice
- Multiple events sequence chart

15.5 Guidelines for reporting incidents involving dangerous goods in packaged form MSC/Circ. 360/Rev 1. of October 28, 1986

- Ships to which these guidelines apply
- When to make reports
- Content of reports
- Action of governments and other interested parties

Texts and references:

- MSC/Circ. 360/Rev.1 of October 28, 1986
- Article 8 of The International Convention for the Prevention of Pollution from ships (MARPOL 73/78)

16 MEDICAL FIRST AID IN ACCIDENT INVOLVING DANGEROUS GOODS

Objectives:

To give the participants knowledge of different types of illnesses resulting from incidents involving dangerous cargoes. To make them familiar with MFAG and IMGS. To enable them to give correct treatment to persons injured in an accident involving dangerous goods.

Lecturers' qualifications

PhD or MSc in medical science with experience in the

treatment of injuries and illnesses caused by dangerous cargoes.

Training aids:

Transparencies, slides, film. Field trip to hospital.

Course description:

16.1 Medical advice relating to the dangers of the carriage of chemicals by ships:

- Awareness of the officers and crew of the general hazards involved
- Master's advice regarding particular chemical hazards to his crew
- Medical advice by radio while at sea
- Priorities of treatment "Immediate Action Table"

16.2 Diagnosis of poisoning

General principles:

- The circumstances of the incident
- The nature of the illness
- Number of persons involved who have developed a similar illness
- Reactions of different individuals to poisons, in terms of time and resistance

The three stages of illness:

- The latent stage
- The active stage
- The late stage

16.2.1 Priorities:

- When finding a casualty
- If only one unconscious casualty
- If more than one unconscious casualty

- If the casualty is in an enclosed space

16.2.2 Unconscious casualty:

- Assessment of breathing and heart function
- Establishing of an open airway
- Mouth to nose respiration
- Alternative method of artificial respiration

16.2.3 Not breathing and heart stopped:

- Technique for heart compression
- Checking effectiveness of heart compression
- Terminating heart compression
- Insertion of Guedel airway
- The high sitting position
- Morphine administration

16.3 The complications of poisoning

16.3.1 Asphyxia:

- Diagnosis
- Treatment

16.3.2 Pulmonary Edema:

- Diagnosis
- Treatment
- Radio for medical advice

16.3.3 Bronchitis:

- Acute Bronchitis
- Diagnosis
- General treatment
- Specific treatment
- Radio medical advice if a woman is pregnant since it is forbidden to use Co-Trimoxazole
- Chronic Bronchitis

16.3.4 Pneumonia:

- Diagnosis

- General treatment
- Specific treatment
- Advice when using Morphine
- Subsequent management

16.3.5 Pleurisy:

- Pleural effusion
- General treatment
- Radio medical advice

16.4 The circulatory system

16.4.1 Acute circulatory collapse:

- Diagnosis
- Treatment
- Radio medical advice

16.4.2 Heart failure:

- Diagnosis
- Treatment
- Radio medical advice

16.5 The Nervous System

16.5.1 Unconsciousness:

- Other causes of unconsciousness apart from poisons
- Diagnosis
- Treatment
- General treatment

16.5.2 Convulsions:

- Treatment
- General treatment
- Radio medical advice

16.6 The Digestive System:

16.6.1 Stomach and intestines:

- Diagnosis
- Pain
- Treatment of pain

16.6.2 Vomiting:

- Treatment of persistent vomiting

16.6.3 Bleeding

16.6.4 Perforation of the cut

16.7 General toxic hazards

16.7.1 Chemical hazards of fire:

- Medical symptoms
- Main toxic chemicals treatment

16.7.2 Hazards of welding:

- "Metal fum fever"

16.7.3 Hazards of explosive chemicals

16.7.4 Hazards of radioactive materials

16.8 Emergency treatment:

- Skin contact
- Eye contact
- Inhalation
- Oxygen therapy

16.9 Medical First Aid Guide for the Use in Accidents Involving Dangerous Goods (MFAG):

- View on the different tables of MFAG

16.10 The International Medical Guide for Ship (IMGS):

- Overview of IMGS contents and the proper way to use it

<u>Texts and references:</u>

- MFAG
- IMGS

- Handouts

17 THE ROLE OF ADMINISTRATIONS AND COMPETENT AUTHORITIES IN THE CARRIAGE OF DANGEROUS GOODS

Objectives:

To give the participants information of the role, activeties and duties of the competent authorities. To enable them to participate in working groups and conventions with full understanding of their duties and role and to help them to implement any conventions.

Lecturers' qualifications:

Master mariner or senior officer from and with experience in administration.

Training aids:

Transparencies, slides, handouts, films.

Course description:

17.1 The role and duties of the administration:

17.1.1 Establishing of national legislation in accordance with the international recommendation of the IMDG Code

17.1.2 Signing, ratification, adoption and implementation of conventions and codes of safe practice or resolutions

17.1.3 Appointing of a standing advisory committee

17.1.4 Appointing of permanent representatives of administrations to the IMO

17.1.5 Participation in the work of the Modal Transport Organizations

17.1.6 Appointing of national IMO committees and working groups

17.1.7 Establishing of emergency legislation

17.2 The role and duties of a competent authority:

17,2.1 Delegation of duties to a competent authority

17.2.2 Unilateral approval

17.2.3 Bilateral approval

17.2.4 Multilateral approval

17.3 Overview on section 22 of the General Introduction to the IMDG Code

17.4 The various possibilities and practices of implementing the IMDG Code

17.4.1 Amendment procedures at national level

17.4.2 Code of safe practice to be drawn up by the industries

17.4.3 Distribution of IMO documentation

Texts and references:

- Section 22 of the IMDG Code
- Handout

18 CASE STUDIES

Objectives:

To give the participants information about some major accidents involving dangerous goods. To enable them to analyse an accident, reach a conclusion, and prepare sufficent recommendations for each case.

Lecturers' qualifications:

Master mariner, senior marine accident investigator.

Training aids:

Transparencies, slides, discussion, film.

Course description:

18.1 Presentation of some major accidents involving dangerous goods:

- The collision of Panamanian bulk carrier M/V SEADANIEL and German container ship M/V TESTBANK on July 22, 1980

18.1.1 List of dangerous goods onboard M/V TESTBANK:

- PETROLEUMNAPTHA (flammable liquid)
- METACRESOL (poison liquid)
- PCP Poison (poison)
- LACQUERS (flammable liquid)
- IRRIGATED cotton

18.1.2 Procedure of presentation of accident:

- Accident
- Injuries to persons
- Damage to vessels
- Environmental damage
- Crew information
- Vessel information
- Waterway information
- Environmental information
- Tests and research
- Shipping regulation
- Other regulations

18.1.3 Analysis:

- Operation of M/V TESTBANK

- Operation of M/V SEADANIEL
- Positions of the vessels in the channel
- Bank effect
- Regulations effecting shipment of hazardous cargo

18.1.4 - Discussion between the participants in working groups
- Discussion with the lecturer

18.1.5 Recommendations and conclusions given by the participants

18.1.6 Conclusions and recommendation as given in the official report

18.2 Presentation of the accident on December 31, 1979, involving the tug boat SENTINEL towing general cargo barger, the KONA and the AGATTKU, due to the failure of a towing cable

18.2.1 List of dangerous cargoes involved in the accident:
1. Chlorine
2. Nitrocarbonitrate
3. Corrosive materials

18.2.2 Investigation procedure:
- Accident
- Injuries to persons
- Damage to vessels
- Other damage
- Crew information
- Waterway information
- Meteorological information
- Tests and research

18.2.3 Analysis:
- Loss of the KONA
- Loss of the AGATTU

18.2.4 - Discussion between the participants in working groups
- Discussion with the lecturer

18.2.5 Recommendations and conclusions given by the participants

18.2.6 Conclusion and recommendation as given in the official report

18.3 Presentation of the collision of PANAMA CITY butan barge with M/V INCA TUPAC YUPANQUI on August 30, 1979:

18.3.1 List of dangerous materials:
- Butane

18.3.2 Investigation procedure:
- Accident
- Events proceeding the accident
- Injuries to persons
- Damage to vessel
- Other damage
- Crew information
- Vessel information
- Waterway information
- Meteorological information
- Wreckage
- Medical and pathological information
- Fire
- Survival aspects
- Tests and research
- Other information
- Steering system regulations
- Fire contingency plans
- Coast Guard monitoring of liquified gas operations

- Structural fire protection
- Siting of docks on the Mississippi River
- Pilot - Master relationship on the INCA TUPAC YUPANQUI

18.3.3 Analysis:
- Steering failure
- Fire contingency plan
- Structural fire protection
- Coast Guard monitoring of liquified gas operations

18.3.4 - Discussion between the participants in working groups
- Discussion with the lecturer

18.3.5 Recommendations and conclusions given by the participants

18.3.6 Conclusion and recommendation as given in the official report

18.4 Discussion, conclucion and recommendations

Texts and references:

- National Transportation Safety Board, Washington D.C. 20594
- Marine accident report

19 TRAINING

Objectives:

To give the participants information of the training facilities offered by different countries and the role of the International Maritime Organization in training and education. To enable them to understand the importance of training and to be aware of the international training facilities available.

Lecturers' qualifications:

Master mariner with a good background in training and education.

Training aids:

Transparencies, slides, handouts, films.

Course description:

19.1 The role of IMO in maritime training and education

19.1.1 The World Maritime University

- Branches of the World Maritime University

19.1.2 View on the STCW Convention (The International Convention on the Standards of Training, Certification and Watchkeeping for the Seafarers 1978)

19.1.3 View on resolution A.537(13) November 17, 1983

19.2 On board training:

- Ship construction and equipment
- Stability
- Cargo spaces available (packaged, bulk, solids, liquids, gases, grain, special purpose ships)
- Seaman ship
- Fire fighting
- Emergency response
- First aid
- Dangerous goods (specialized courses for bulk, tanker, chemical, gas carrier, container ship, Ro/Ro ship)
- Radio for Medical Advice

19.3 Port training:

- Hazards and risks of dangerous cargoes
- Comprehension of marking and labels/placards

- Personal protection
- Emergency response
- First aid
- Communication channels
- Contingency plan
- Good housekeeping

19.4 Self study courses:

- The concept of the proposal of self study courses
- Types of courses proposed
- Discussion

Texts and references:

- IMO training programme
- The International Convention on Standards of Training Certification and Watchkeeping for Seafarers 1978 (STCW)

PART IV

METHODS OF EVALUATING THE COURSE AND ASSESSMENT THE KNOWLEDGE GAINED BY THE PARTICIPANTS

FOLLOW-UP SYSTEM

INTRODUCTION

Training and education are very important aspects for all modes of transport. When specifying transport by the marine mode we find that training and education are vital elements for improving the safe transport of cargoes at sea.

IMO has recognized this fact by resoulutions 11 and 13 of the International Conference on Standards of Training and Certification and Watchkeeping for Seafarers 1978 (STCW). This is a practical solution of IMO to ensure that the standards of training and education in sea transportation is homogeneous.

Resolution A.537(13) sets out all necessary knowledge required for seafarers in order to enable them to carry out their duties in a proper manner.

In order to evaluate and improve the course it is necessary to receive feed-back on the course structure, as well as the material and syllabus. The knowledge gained by the participants should also be assessed when evaluating the course.

EVALUATION OF THE COURSE

A questionaire at the end of the course, answered by the participants, will be a good method for evaluating the course.

A Course evaluation

A questionaire could be as follows:

1 GENERAL IMPRESSION OF THE COURSE

		Good	Fair	Low
a	Overall impression	___	___	___
b	Professional standard of course material	___	___	___
c	Professional standard of lecturers	___	___	___
d	Opportunities for discussion	___	___	___
e	Field trips	___	___	___
f	Laboratory facilities	___	___	___
g	Classroom facilities			
h	Mix of theory and laboratory/ demonstrations	___	___	___
i	Opportunities for discussion	___	___	___
j	Course administration	___	___	___
k	Standard of audiovisual aids (films, slides, etc.)	___	___	___
l	How well could you follow the presentations?	___	___	___

2 WHICH TOPICS SHOULD HAVE BEEN GIVEN MORE ATTENTION?

3 WHICH TOPICS SHOULD HAVE BEEN GIVEN LESS ATTENTION?

4 FOR YOUR PERSONAL INTEREST, WHICH WERE THE MOST USEFUL TOPICS?

6 DO YOU THINK THAT THE TIME ALLOCATED TO THE PRESENTATION OF EACH SUBJECT WAS ADEQUATE?

7 HOW IN YOUR OPINION COULD THE COURSE BE IMPROVED?

B Assessment of the knowledge gained by the participants

All topics, except securing of dangerous cargo in packaged forms (14), are compulsory for all categories of participants. No 14 is optional for all categories except for master mariners and seafarers.

A diploma will be issued to participants having passed the examination. Option No 14 will be included in the examiniation for seafarers only.

The examination form recommended for this course should contain sujbective questions as well as objective questions (multiple-choice questions).

Samples of the subjective questions:

1 EXPLAIN THE RELATIONSHIP BETWEEN THE 1974 SOLAS COVENTION AND THE IMDG CODE.

2 STATE THE NECESSARY DOCUMENTATION REQUIRED FOR A SHIP CARRYING DANGEROUS GOODS IN PACKAGED FORM ACCORDING TO THE IMDG CODE.

3 EXPLAIN WHY BAD MANGAGEMENT IN SHIPPING COMPANIES COULD RESULT IN UNSAFE CARRIAGE OF DANGEROUS GOODS.

4 LIST AND IDENTIFY THE CLASSES OF DANGEROUS GOODS AS MENTIONED IN THE IMDG CODE.

Samples of the objective questions in a form of multiple-choice examination.

1 THE 1974 SOLAS CONVENTION REGULATIONS GOVERNING THE CARRIAGE OF DANGEROUS GOODS APPLY TO:

a All ships and passenger ships when engaged on any voyage?

b All ships and passenger ships of 500 tons gross tonnage or more when engaged on an international voyage?

c All ships and passenger ships when engaged on an international voyage?

d All of the above?

2 IN THE IMDG CODE, THE FOLLOWING CLASSES OF DANGEROUS GOODS ARE SUBDIVIDED:

(identify by X)

a Class 1 Class 2 Class 3 Class 4 Class 5 Class 6 Class 7 Class 8 Class 9

C Follow-up system

The academies or the organizations running the course should establish a follow-up system.

The follow-up system can be summarized as follows:

1 Annually questionaire should be sent to the participants graduated from the course in order to identify their output in their jobs and at the same time find out what practical problems still face them.

2 The questionaire should be analysed and suggestions given by the participants considered. Changes in the course found to be necessary should be done in order to achieve the practical needs of the personnel involved in the carriage of dangerous goods.

3 To participate in international conferences/seminars concerning the carriage of dangerous goods.

4 To be in close contact with any Standing Advisory Committees of their country.

5 To keep in contact with the industry.

6 To analyse any accident involving dangerous goods and then, if found relevant, include it in the case studies.

8 Updating of the course material and syllabus.

PART V

GENERAL GUIDELINES FOR LECTURERS

GENERAL GUIDELINES FOR LECTURERS

1 The lecturers must have a full understanding of the objectives of the topics beeing taught by them.

2 The presentation of lessons should attempt to create situations where the participants are involved in interactive participation during teaching/learning process.

3 When conveying information the media of dictation and note-taking should be limited.

4 The use of case studies should be introduced.

5 Prior to the presentation of practical demonstrations and laboratory experiments it should be ensured that all necessary equipment is available and in good working condition.

6 Lecturers should bear in mind that a discussion during a lecture is a good means of evaluating the teaching/ learning process.

7 The learning process should aim at including the acquisition and development of the skills necessary to the tasks that the participants are expected to perform.

9 The maximum use of audio-visual aids is recommended.

REFERENCES AND TEXTS

R1 The International Convention for the Safety of Life at Sea (SOLAS) and any protocols thereto.

R2 The International Convention for the Prevention of Pollution from Ships (MARPOL) and any protocols thereto.

R3 The International Maritime Dangerous Goods (IMDG) Code and any amendments thereto.

R4 The Brochure of Labels.

R5 The Medical First Aid Guide (MFAG) for Use in Accidents involving Dangerous Goods and any supplement thereto.

R6 The Emergency Procedures for Ships (EmS) Carrying Dangerous Goods - Group Emergency Schedules and any supplement thereto.

R7 The Code of Safe Practice for Solid Bulk Cargoes (BC Code) and any supplement thereto.

R8 The IMO/ILO Guidelines for Packing of Cargo in Freight Containers or Vehicles and any supplement thereto.

R9 The Recommendations on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas and any supplement thereto.

R10 The ILO/IMO Document for Guidance and any supplement thereto.

R11 IMO Assembly resolution A.81(IV) - Approval of the International Maritime Dangerous Goods (IMDG) Code.

R12 IMO Assembly resolution A.434(XI) - Code of Safe Practice for Solid Bulk Cargoes.

R13 IMO Assembly resolution A.437(XI) - Training of Crews in Fire-Fighting and any amendments thereto.

R14 IMO Assembly resolution A.573(13) - Training of Officers and Ratings responsible for Cargo Handling on Ships Carrying Dangerous and Hazardous Substances in Solid Form in Bulk or in Packaged Form.

R15 IMO MSC/Circ. 360 - Guidelines for reporting incidents involving dangerous goods in packaged form.

R16 New cargo handling techniques implementations for port employment and skills by A.D. Couper.

R17 Port management textbook containerization by the Institute of Shipping Economics and Logistics, Börsenhof A, Am Dom 5a D-2800 Bremen, Editor Dr. Hans Ludwig Beth.

LIST OF FILMS

F1 Dangerous Goods at Sea, part I (20 min).

F2 Dangerous Goods at Sea, part II (20 min).

F3 Movement of Dangerous Goods by any mode of transport, (10 min).

F4 Movement of Dangerous Goods by sea, (7 min).

F5 Fighting Pollution, (25 min).

F6 Use of Compressed Air Breathing Apparatus, (11 min).

F7 Enclosed Spaces, (30 min).

F8 Fire Prevention, (19 min).

F9 Boona, (20 min).

F10 Fire Chemistry, (30 min).

F11 RoRo Safety and Cargo Operation, part I (25 min).

LIST OF ANNEXES

U.N. COMMITTEE CLASSIFICATION 1948	CORRESPONDING CLASSIFICATION IN OTHER REGULATIONS								
	Safety of Life at Sea Convention	British Sea Transport	Coast Guard Regulations	French Marine Regulations	Suez Canal	IATA	Annex I to the CIM	French Inland Transport Regulations	Interstate Commerce Commission Regulations
Class 1	(i)	Section 1	Covered	Classes Ia, Ib & Ic	Cat.1,2 & 3 Group a	Covered	Classes Ia, Ib & Ic	Classes Ia Ib & Ic	Sub-part B
Class 2	(ii)	Section 2	Covered broadly	Class Id	Cat. 2 & 3 Group d	Covered broadly	Class Id	Class Id	Sub-part F
Class 3 a)	(viii)	Section 8	Covered broadly	Class II	Cat.1,2 & 3 Group b	Covered broadly	Class II	Class II	Sub-part D
Class 3 b)	(v)	Section 5	Covered	Class IIIa	Cat.1,2 & 3 Group a	Covered to 101°F (38.3°C	Class IIIa	Class IIIa	Sub-part C
Class 3 c)	Nil	Section 7B	Covered	Class IIIb	Cat.1,2 & 3 Group c	Covered	Class IIIb	Class IIIb	Sub-part D
Class 3 d)	(vi)	Section 6	Covered broadly	Class Ic	Cat.1,2 & 3 Group b	Covered broadly	Class Ic	Class Ic	Sub-part D
Class 4	(vii)	Section 7A	Covered	Class IIIc	Cat.2 Group e	Covered	Class IIIc	Class IIIc	Sub-part D
Class 5 a)	(iv)	Section 4	Covered	Class IV	Cat.1,2 & 3 Group d	Covered	Class IVa	Class IV	Sub-part G
Class 5 b)	(ix)	Nil	Nil	Nil	Nil	Nil	Class VI	Class VI	Nil
Class 6	(ix)	Section 9	Nil	Nil	Nil	Covered	Class IVb	—	Sub-part G
Class 7	(iii)	Section 3	Covered	Class V	Cat.2 & 3 Group d	Covered	Class V	Class V	Sub-part E
Class 8	(ix)	Section 9	Covered	Nil	Nil	Covered	Class VII	Nil	Nil

Example of Forwarding/Shipping Document

APPLICATION FOR FORWARDING/SHIPMENT OF DANGEROUS OR HAZARDOUS CARGO

To: Carrier "X"

(Rail
(Road
(Inland navigation
(Air
(Sea

Please confirm acceptance of the following goods for forwarding/shipment per

Shipping/ Forwarding Mark and Destination or address	Package Nos.	Description of Packages etc.	Name of goods and Code No.	Flash Point (if any) Fahr.or Cent.	Net Weight kilos or cwts.qrs.lbs.	Total Measure-ment cu.ft. or cu.metres	Class No.

In consideration of your so doing we certify that the goods are packed in a manner adequate to withstand the ordinary risks of handling and transport by (.....) having regard to their nature.

To conform with this requirement the goods are packed in accordance with the recommendations contained in the ....., and the package or packages labelled or stencilled on the outside to indicate the identity of the goods and the nature of the danger to which the goods give rise.

Signature .....
(This declaration must be signed by a duly authorized person)

.....

Date .....19 ...

Name and address of consignor

Annex III

FINAL SUMMARY DANGEROUS GOODS

DANG. GOODS DEPARTMENT

PAGE:
OF

TO: ______________________

TO: ______________________ DATE / TIME: ______________________

TO: ______________________ VESSEL / VOYAGE: ______________________

TO: ______________________ LOADING PORT: ______________________

CTR. OPERATOR PORT OF DISCH. REF. NUMBER	CONTAINER NUMBER	CONTAINER TYPE SIZE	IMDG-CODE CLASS / UN-NO. ADD. LABEL	SOL. LIQ.	INFL. VAP.	PROPER SHIPPING NAME OR SPECIAL STOWAGE, SEGREGATION	O.D.	U.D.	CTR. WT.	STOWAGE

PLEASE STATE STOWAGE POSITIONS OF REEFERS AS WELL AS SHIFTED CONTAINERS!

Annex IV PAGE 1

TANK CONTAINER-INSPECTION-REPORT

Vessel: _____ Voyage: _____ Place/date: _____

General Information:

Each Tank must bear a metal identification plate.

Tanks and their fittings (appurtenances) shall be visually inspected internally and externally at intervalls not exceeding **2,5 years**. Tanks shall be hydrostatically tested and completely inspected internally and externally at intervalls of not more than **5 years**.

The test dates shall be durable and legibly marked on the identification plate.

TC-Number						
Does the tank bear the identification plate? Tank's manufacture date?						
Date of last hydrostatic test? (Test to be completed every 5 years!)						
Date of last visual inspection? (Inspection to be completed at least every 2,5 years!)						
Has the tank been marked with the proper shipping name of the substance being transported and placarded accordingly?						

Technical Inspection prior to shipping

Tank containers found to be leaking or significantly damaged shall not be accepted for shipment. If evidence of any bad condition is discovered by the person performing the inspection which may render the tank unsafe for service, the approved inspection agency (approval agency) which supervised the construction etc. shall be consulted.

Is the tank safe for service?	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

PLEASE SEND COPY OF REPORT

Signature: _____

Annex IV PAGE 2

LIST OF DANGEROUS GOODS CONTAINERS

DANGEROUS GOODS DEPARTMENT

To:

Copy:

Vessel:

Voyage:

Seq. No.	Operator	Reference No.	Container Size	M H L	IMDG-Class	Flash Point	Stowage	Remarks
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					
			X					

Dange... goods dep...ment

Annex V

DANGEROUS GOODS BOOKING PROCEDURE