

# **THE HISTORY OF MARPOL**



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**2017**

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**ΘΕΜΑ: THE HISTORY OF MARPOL**

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**Ημερομηνία ανάληψης της εργασίας:**

**Ημερομηνία παράδοσης της εργασίας:**

<b>A/A</b>	<b>Όνοματεπώνυμο</b>	<b>Ειδικότης</b>	<b>Αξιολόγηση</b>	<b>Υπογραφή</b>
<b>1</b>				
<b>2</b>				
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<b>ΤΕΛΙΚΗ ΑΞΙΟΛΟΓΗΣΗ</b>				

**Ο ΔΙΕΥΘΥΝΤΗΣ ΣΧΟΛΗΣ :**

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### **ABSTRACT**

In the following dissertation we analyze the history of MARPOL 73/78 starting by referring to OILPOL the convention for the protection of the environment that existed prior to MARPOL. Then we analyze MARPOL in general, the Torrey Canyon, Argo Merchant and Amoco Cadiz oil spills. Furthermore we examine the 2 conventions which created MARPOL the 1973 convention for the Prevention of Pollution from Ships and the 1978 Conference on Tanker Safety and Pollution Prevention. Finally we mention and describe with great detail all 6 annexes that are contained in MARPOL.

## PROLOGUE

Although marine pollution has a long history, meaningful and effective international laws to counter it were only enacted during the twentieth century. Beginning in the 1950's, marine pollution became a concern during the course of several United Nations Conferences regarding the Law of the sea. At that time, it was believed by most scientists that the oceans were so vast that they had unlimited ability to dilute, and thus render pollution harmless.

Marine pollution occurs when harmful, or potentially harmful, effects result from the entry into the ocean of chemicals, particles, industrial, agricultural and residential waste, noise, or the spread of invasive organisms. The main types of pollution which are caused by ships specifically are Toxic waste, harmful substances carried in packages, sewage discharging, by the disposal of garbage, air pollution, noise pollution and last but not least oil pollution.

In order to address this harmful situation the International Convention for the prevention of pollution of the sea by oil, 1954, (OILPOL) was amended in 1962, the wreck of the Torrey Canyon in 1967 sparked controversy and resulted in a series of conventions and other instruments, including further amendments to the 1954 Convention, which were adopted in 1969.

In 1971, the International Convention for the prevention of pollution of the sea by oil, 1954, (OILPOL) was amended again, however it was generally felt that an entirely new instrument was required to control pollution of the seas by ships. Finally, in 1973 IMO convened a major conference to discuss the whole problem of marine pollution by ships. It resulted in the adoption of the first ever comprehensive anti-pollution convention, the International Convention for the Prevention of Pollution from Ships and thus MARPOL was born. Its objective was to minimize pollution of the oceans and seas and preserve the marine environment.

In 1978, IMO convened a Conference on Tanker Safety and Pollution Prevention, which adopted a protocol to the 1973 MARPOL Convention introducing further and stricter measures which included requirements for certain operational techniques and a number of modified constructional requirements. The Protocol of 1978 relating to the 1973 MARPOL Convention in effect absorbs the parent Convention with

modifications. This combined instrument is commonly referred to as MARPOL 73/78 and came into effect in October 1983. The Convention has been amended as required on several occasions since then.



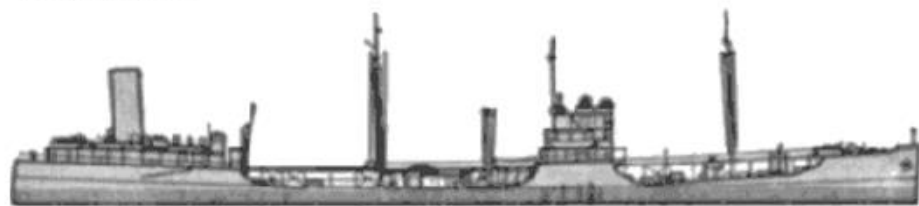


## CHAPTER 1: OILPOL

The world's first oil tankers were introduced at the end of the 19th century and transported kerosene for lighting, but the invention of the motor car brought about the demand for oil. During World War 2, the typical oil tanker was the T2, standard T2s were 501 ft 6 in (152.9m) in total length, with a beam of 68 ft (20.7 m). Rated at 9,900 tons gross (GRT), with 15,850 long tons deadweight (DWT), standard T2s displaced about 21,100 tons. Steam turbines driving a single propeller at 12,000 horsepower (8,900 kW) delivered a top speed of 16 knots (30km/h), but tankers grew rapidly in size from the 1950s onwards.



TANKER, T-2



T2-SEA1

The first 100,000-tonne crude oil tanker was dispatched in 1959 to cover the route from the Middle East to Europe round the Cape of Good Hope in South Africa (thereby bypassing the Suez Canal which had been temporarily closed following political conflicts in 1956). Shippers foresaw that the larger the tanker, the more profitable the venture thus by the mid-1960s, tankers of 200,000 tonnes deadweight—the Very Large Crude Carrier or VLCC - had been ordered.

The possibility of oil contaminating the marine environment became acknowledged by the International Convention for the Prevention of Pollution of the Sea by Oil, 1954 (OILPOL 1954). The Conference endorsing the Convention was coordinated by the United Kingdom government, and the Convention provided for particular functions to be undertaken by IMO when it came into being. In fact, the Convention

establishing IMO entered into force in 1958 just a few months before the OILPOL convention entered into force, so IMO effectively managed OILPOL from the start, initially through its Maritime Safety Committee.

In the 1950s, the normal practice was simply to wash the tanks out with water and then pump the resulting mixture of oil and water into the sea. The 1954 OILPOL Convention which entered into force on 26 July 1958, recognized that most oil pollution resulted from routine shipboard operations such as the cleaning of cargo tanks and attempted to tackle the problem of pollution of the seas defined as crude oil, fuel oil heavy diesel oil and lubricating oil in 2 main ways:

- It established “prohibited zones” extending at least 50 miles from the nearest land in which the discharge of oil or of mixtures containing more than 100 parts of oil per million was forbidden
- It required Contracting Parties to take all appropriate steps to promote the provision of facilities for the reception of oily water and residues. In 1962, IMO adopted amendments to the Convention which extended its application to ships of a lower tonnage and also extended the "prohibited zones".

Meanwhile, IMO in 1965, set up a Subcommittee on Oil Pollution, under the auspices of its Maritime Safety committee, to address oil pollution issues.

Amendments adopted in 1969 contained regulations to further restrict operational discharge of oil from oil tankers and from machinery spaces of all ships.

Even though the 1954 OILPOL Convention was in part handling oil pollution growth, developments in industrial practices were beginning to make it clear that further action was necessary. However, pollution control was still a minor concern for IMO, not to mention the world was only starting to become aware of the environmental ramifications of a growing industrial society

## CHAPTER 2: MARPOL

### 2.1 Generally

The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) is the most dominant international marine convention created by the International Maritime Organization (IMO) in order to prevent pollution from ships, which may manifest as a result of both accidental and operational causes. The Convention, is an instrument which entered into force on the 2<sup>nd</sup> of October 1983 and originated from 1973 International Convention for the Prevention of Pollution from Ships and the 1978 Conference on Tanker Safety and Pollution Prevention.

MARPOL 73/78 is not only the key convention protecting the marine environment but it also protects the atmosphere from pollution by ships. The 1967 Torrey Canyon accident was the catalyst for the adoption of the MARPOL convention, it was the biggest oil tanker spill recorded at the time, which led to the creation of a devoted subcommittee on pollution from ships at IMO (Marine Environment Protection Committee) and the development and adoption of MARPOL, as well as a series of global treaties addressing liability and compensation for damage from oil pollution.

Throughout the years, numerous accidents and technological advancement, triggered amendments to pollution requirements, with IMO providing a forum for its member states to work together in order to ensure a proper global response to issues as they arose.

A number of tanker accidents resulted in the 1978 Conference on Tanker Safety and Pollution Prevention. It adopted a series of measures concerning tanker operation and design, which were incorporated into the Protocol of 1978 relating to SOLAS and the Protocol of 1978 relating to the 1973 MARPOL convention. The MARPOL Protocol introduced measures involving the protective location of segregated ballast tanks, to minimize the probable amount of cargo which may spill into the ocean due to an accident.

Subsequent amendments to MARPOL which were adopted in 1983 banned the carriage of oil in the fore-peak tank. The 1989 Exxon Valdez oil disaster led to the adoption, in 1992, of double hull amendments which were obligatory for new oil tankers of 5000 dwt and above built after 1996 to be fitted with double hulls, or an

alternative design permitted by IMO. In order to discontinue the use of single-hull tankers a phase-out process was adopted. The result being that all ships over 25 years old were gradually taken out of service or modified.

In 1999 the Erika accident provoked the adoption of amendments to MARPOL in order to hasten the phase-out of single-hull oil tankers. In 2002 after the sinking of the Prestige, the timetable was altered again by additional amendments which were adopted in 2003. These and other global measures have helped defend the marine environment from oil spills.

Statistics obtained by the International Tanker Owners Pollution Federation (ITOPF) display that the number of large oil spills had been reduced from 246 incidents in the 1970s to 33 in the 2000s. From 1970 to 1979, there was an average of 24.6 spills per year, falling to an average 3.3 spills per year from 2000 to 2009, and an average of 1.7 spills per year during the period between 2010 and 2012.

The MARPOL 73/78 Convention contains six technical Annexes which cover numerous aspects relevant to the prevention of marine pollution. Most Annexes appoint special areas (the Mediterranean Sea area, the Baltic Sea area, the Gulfs area, the Antarctic area and others) where, for ecological and technical reasons and the distinct character of their traffic, harsher compulsory regulations are adopted in order to prevent pollution.

Amendments to the technical Annexes of MARPOL 73/78 are usually adopted either by IMO's Marine Environment Protection Committee (MEPC) or by a Conference of Parties to MARPOL. Amendments are adopted using a procedure which is called "tacit acceptance" and they enter into force on a specified date unless an agreed number of States Parties object by a specific date.

The Annexes which are incorporated in MARPOL are the following:

Annex I: Prevention of pollution by oil (entered into force 2 October 1983)

Annex II: Control of pollution by noxious liquid substances (entered into force on 6 April 1987)

Annex III: Prevention of pollution by harmful substances in packaged form (entered into force on 1 July 1992)

Annex IV: Prevention of pollution by sewage from ships (entered into force on 27 September 2003)

Annex V: Prevention of pollution by garbage from ships (entered into force 31 December 1988)

Annex VI: Prevention of Air Pollution from Ships (entered into force on 19 May 2005)

At the moment, 153 countries are members of the MARPOL 73/78 Convention, representing 98.52% of the world shipping tonnage, which means that it has global application. All ships bearing the flag of a contracting party to MARPOL must be submissive to its regulations, no matter where they sail. The members are responsible for the survey and inspections of the ships that act under their authority and issue all the required certificates. Last but not least they are responsible for sanctioning any violation of MARPOL 73/78.

Violations of the MARPOL 73/78 Convention within the jurisdiction of any member is punishable either under the law of the flag State or under the law of the specific member. In this regard, the term "jurisdiction" in the Convention should be defined in the light of international law which is in force at the time the Convention is enforced or interpreted. Ships that engage on international voyages must carry authentic and accurate international certificates which may be recognized at foreign ports as prima facie evidence that the vessel complies with the demands of MARPOL. With the exception of very small vessels

Yet, if the authority carrying out the inspection has evidence that the ship's condition or its equipment do not coincide substantially with the particulars of the certificate, or if the ship does not carry a valid certificate, then the authority may detain the vessel until it is satisfied that it is seaworthy and it doesn't present a threat to the marine environment.

Article 17 states that the members of the Convention must accept the commitment to promote support for members requesting technical assistance for various purposes, for example; training, supply of equipment, research, combating pollution and more, in consultation with other international bodies and with the aid of UNEP (United Nations Environment Programme).

## ***2.2 Training, surveying, reporting and routeing***

In addition to ship design and construction prerequisites the focus has also been on the human element, particularly in training standards and watch keeping in the STCW treaty as well as the adoption of the compulsory International Safety Management (ISM) Code in 1994. The significance of survey and certification obligations has been highlighted with measures adopted to improve the procedure, including the creation of the harmonized system of survey and certificates (HSSC) which adopted in 1990 additional amendments to MARPOL and other conventions.

Surveys have been made stricter by other requirements, such as the upgraded survey program which was set into force in 1995 for oil tankers and bulk carriers older than five. Also the condition assessment scheme for specific oil tankers, produced by the post- Erika MARPOL amendments.

Compulsory ship routeing systems and ship reporting schemes have also been introduced. Additionally, the denomination of special areas and particularly sensitive sea areas, with related protective measures such as ship routeing systems, has also contributed to a drop in pollution caused by ships and an increase of 'green' awareness.

## ***2.3 P&I Clubs***

P&I insurance (Protection and indemnity insurance) is a form of mutual maritime insurance contributed by a P&I Club. A P&I Club provides cover for open-ended risks that traditional insurers are reluctant to insure, such as a carrier's third-party risks for damage caused to cargo during carriage, war risks, and risks of environmental damage such as oil spills and pollution.

It is notable that P&I Clubs normally cover loss, damage, liabilities, costs and expenses (such as; cleaning up expenses, costs of any acts to prevent or minimize pollution, liability for loss, damage or pollution) associated to pollution risk connected with danger of any substance escaping from the insured vessel.

Yet, the insurance doesn't apply to loss, damage, liability, costs or expenses which were obtained due to discharge or escape in any land-based, dump, site, storage, or disposal facility. Additionally, P&I Clubs usually make distinction between pollution caused by an infringement of MARPOL and accidental pollution. Correspondingly, there is recovery for penalties and fines only in the case that the escape or discharge

from the insured vessel was accidental, and there is no recovery for penalties and fines originating out of an infraction of the MARPOL regulations, which are defined below.

Shipowners must be aware of three main points that underlie the Convention in order to comply with MARPOL. The main points are the following:

- The sanctioning of violations.
- The issue of certificates.
- Drafting a report in case of an incident.

Essentially, any violation of MARPOL 73/78, no matter where the violation takes place, shall be prosecuted under the law of the country under whose authority the ship is operating. When any violation occurs within the jurisdiction a Contracting Party, sanctions shall be established under the law of that Party (Art.4, MARPOL 73).

Furthermore, a ship is required to have on board a valid certificate in accordance with the regulations. The vessel can be inspected by authorized officers of a Party whether there is such a certificate on-board, while in ports or offshore terminals of that Party if the Party investigators can't find the certificate they may prevent the ship from sailing if it presents a danger to the marine environment (Art.5, MARPOL 73).

Finally, the master of a vessel should promptly make an extensive report of any incident that involves harmful substances to the department responsible for the issuance of the respective certificate (Art.8, MARPOL 73).

A report shall be made in the event of:

- Discharge of oil or of noxious liquid substances above the permitted level.
- Discharge of harmful substances in packaged form.
- Damage, failure or breakdown of a ship of 15 meters in length or above.

(Art.II, Protocol I, MARPOL 78).

#### ***2.4 Offenses relating to the MARPOL Convention***

The Federal Maritime and Hydro-graphic Agency (BSH) is the dominating authority that takes action against administrative offenses. The BSH pursues and prosecutes offenses perpetrated by maritime traffic against national regulations and international conventions created for the protection of the marine environment, provided that the offenses are not criminal in nature.

According to the Maritime Environmental Behavior Regulations, an offense is committed by a person in charge of a ship who does not properly keep cargo, oil or

garbage record books or does not monitor the discharge regulations set by the MARPOL Convention.

Port Police in 2014 detected violations in 1,533 cases out of a total of 9,031 inspections on vessels. For minor violations, the port police issued warnings involving a fine to the master and engineers which who involved, the fines that were imposed were up to € 55 in individual cases.

In total 175 of the cases were redirected to the BSH for additional prosecution. The results of these proceedings we the following; 61 cases were closed and an average fine of 395 euros was imposed. The fifteen ships which had foreign flags could not be prosecuted under German jurisdiction and were reported to the corresponding flag states for further prosecution.



### CHAPTER 3: TORREY CANYON

The SS Torrey Canyon was an LR2 Suezmax Class oil tanker with a cargo capacity of 120,000 tons of crude oil. When laid down by the Newport News Shipbuilding and Drydock Company in the USA in 1959, she had a capacity of 60,000 tons but the ship was later enlarged to 120,000 tons capacity.

On her last voyage, the Torrey Canyon left the Kuwait National Petroleum Company refinery at Mina Al-Ahmadi, Kuwait, with a full cargo of crude oil on 19<sup>th</sup> of February 1967. She reached the Canary Islands on the 14<sup>th</sup> of March, from there the planned destination was to Milford Haven in Wales. Following a navigational error on the 18<sup>th</sup> of March the Torrey Canyon struck Pollard's Rock between the Cornish mainland and the Isles of Scilly.

Due to the fact that the tanker didn't have a scheduled route, it lacked a compliment of full scale charts of the Scilly Islands. In order to navigate the area, the vessel used LORAN rather than the more accurate Decca Navigator. When a collision with a fleet of fishing boats became unavoidable, confusion between the Master and the helmsman as to their exact position arose. Due to the uncertainty of whether the vessel was in automatic or manual steering, further delay incurred. By the time the issue was solved, a grounding was upon them. In the days which followed, considerable effort to float the ship off the reef failed. Further attempts to shift the vessel were unsuccessful and it started to break apart.



Every drop of the crude oil borne by the ship began to seep into the Atlantic, thus the focus became cleanup and containment of the resulting oil spill. By the end of the day an eight-mile slick had escaped from the ship's ripped hull. The next day the slick had spread and was 20 miles long. It eventually bled into a 270 sq m (700 km<sup>2</sup>) vile-smelling smear. Dispersant's were deployed on a large scale by the British government in an attempt to dissolve the oil, more than two million gallons of a chemical named BP 1002 was sprayed onto the afflicted waters, which later proved to be toxic to marine life. Hoses and watering cans were used over beaches in order to spray the detergent by volunteers, fishermen pumped BP 1002 into the water from their boats, even barrels filled with chemicals were penetrated and rolled off cliffs by the Army.

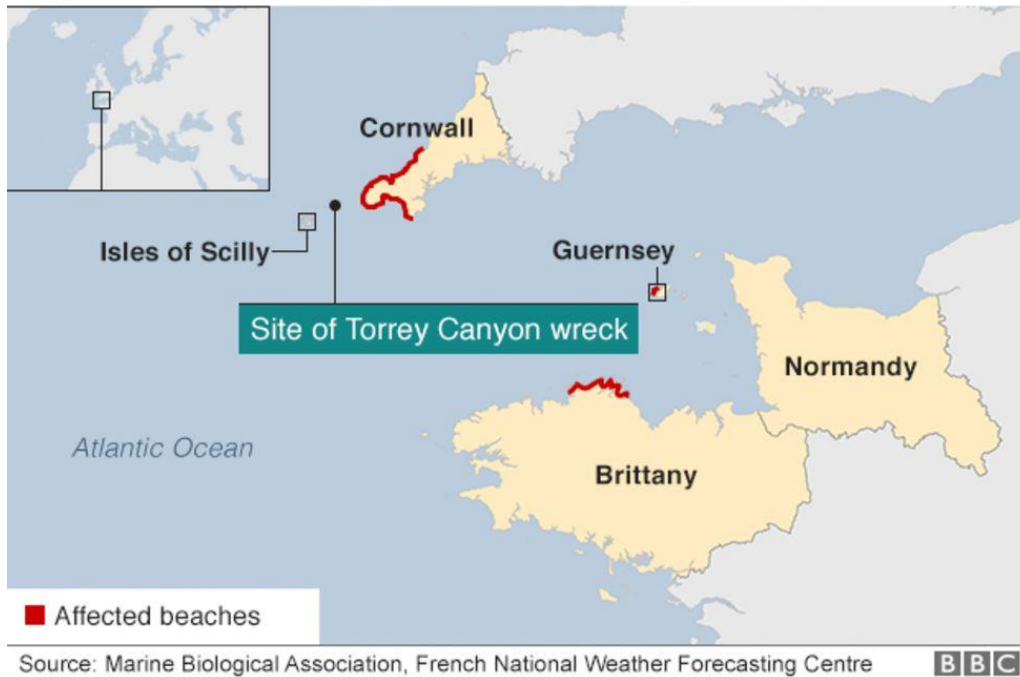
A cabinet meeting was held by the Prime Minister of Great Britain at the Royal Naval Air Station Culdrose and it was decided that the wreck should be set on fire, by employing air strikes from the Royal Air Force (RAF) and the Fleet Air Arm (FAA) in order to restrain the extent of the oil disaster.

Ten day later, on the 28<sup>th</sup> of March 1967, the Fleet Air Arm sent Blackburn Buccaneer planes from RNAS Lossiemouth to drop forty-two 1,000-lb bombs on the ship and the surrounding slick. Additionally, the Royal Air Force sent Hawker Hunter jets from RAF Chivenor to drop cans of aviation fuel to make the oil flare up. Of the 42 bombs directed at the target, some missed, others didn't explode and the tide kept extinguishing the flames. Therefore extra bombing runs by the Sea Vixens from the RNAS Yeovilton and Buccaneers from the Royal Navy Air Station Brawdy were required, as well as more RAF Hunters with liquefied petroleum jelly to ignite the oil. Bombing continued into the next day before the Torrey Canyon eventually sank to the bottom of the ocean. In total, 16 rockets, 1,500 tons of napalm 44,500 liters of kerosene and 161 bombs were used. The British government was strongly criticized for its handling of the incident, which was at that time the most expensive shipping disaster in history. Not to mention, the Royal Air Force and the Royal Navy were victims of ridicule, as 25% of the 42 bombs dropped missed the enormous stationary target.



About 50 miles (80 km) of French and 120 miles (190 km) of Cornish coast were contaminated. Approximately 15,000 sea birds were killed, along with huge numbers of marine organisms, before the 270 square miles (700 km<sup>2</sup>) slick dispersed. Much damage was caused by the heavy use of so-called detergents to break up the slick. The British clean-up effort, exacerbated the situation. It took 13-15 years for the treated areas to recover, whereas in areas where the detergent was not used, recovery took 2-3 years. The approach in France was perhaps less scientific, but proved to be more merciful on nature even though Brittany was hit by the thickest part of the slick. The French let the oil come ashore and then gathered it up. On their rocky beaches, the oil that remained gradually weathered and the marine life was not as badly affected. There is some discrepancy as to exactly when the slick reached the shores of Guernsey. Some reports stated 7 days whereas others stated 19 days. The chosen solution was to suck the oil into sewage tankers, transport 3,000 tons of it, mixed with sand, to a granite quarry on the island. Some of the oil was later recovered and burned for power in the 1980s, but most sat in the quarry's waters, occasionally coating guillemots in oil. Eventually, micro-organisms were deployed in the hope they would convert the oil over time into water and carbon dioxide, but after a large quantity of oil surged to the surface in 2009, more extreme measures were called for. In total, 160,000 liters of contaminated water was removed by buckets.

## Spread of Torrey Canyon oil spill



Claims were made by the British and French governments against the Barracuda Tanker Corporation which was the owner of the vessel and the subsequent settlement was the largest ever in marine history for an oil claim. The British government was able to serve its writ against the owners only by arresting the Torrey Canyon's sister ship, the Lake Palourde, four months later when she docked for provisions at Singapore. An up and coming British lawyer, Anthony O'Connor, who worked for the Singaporean law firm, Drew & Napier, was deputized to arrest the ship on behalf of the British government by attaching a writ to its mast. Because the ship's crew thought he was a whiskey salesman, O'Connor was able to board the ship and serve the writ. Even though the French government was alerted to the Lake Palourde's presence and pursued the ship, they were unable to board and serve their writ.

The Torrey Canyon incident remains Britain's biggest oil spill at up to 117,000 tonnes, which is 1,231-times more than the amount leaked by a BP North Sea platform in 2016. The spill ignited the first big rush of environmental volunteering. People traveled from Bristol and further afield in an attempt to clean birds using any and every means at their disposal. The silver lining was that the incident raised questions about the existing measures in place to prevent oil pollution from ships and it also exposed deficiencies in the system for providing compensation following accidents at

sea. It was essentially this incident that set in motion the chain of events that eventually led to the adoption of MARPOL.

The Torrey Canyon spill was a turning point for the world it taught us invaluable lessons about the response to disasters, toughened up shipping safety and stirred green activism.

## **CHAPTER 4: 1973 International Convention for the Prevention of Pollution from Ships**

Following the Torrey Canyon incident, in 1969, the IMO Assembly convened an international conference to introduce an entirely new convention. Simultaneously, the Sub-Committee on Oil Pollution was renamed the Sub-Committee on Marine Pollution, to broaden its scope, which went on to become the Marine Environment Protection Committee (MEPC). MEPC was eventually given the same standing as the Maritime Safety Committee, including a brief to deal with all matters pertaining to marine pollution.

A conference was scheduled for October-November 1973, and preparatory meetings began in 1970. Furthermore, in 1971 IMO adopted amendments to OILPOL 1954, in order to limit the size of cargo tanks in all tankers ordered after 1972. The intention was that in the event of damage to the vessel, only a limited amount of oil could enter the sea.

In June 1972, the United Nations Conference on the Human Environment which took place in Stockholm granted a global forum for discussions on the environment. In the same year, the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter was adopted in a London conference, this convention controlled the dumping of industrial and other wastes at sea by ships and aircrafts. The conference which adopted the International Convention for the Prevention of Pollution from Ships (MARPOL) was held against a background of increased global awareness of the need to protect the environment in London. The 1973 conference which took place from the 8<sup>th</sup> of October till the 2<sup>nd</sup> of november1973 was attended by representatives from 71 countries.

As recorder in the “Final Act of the International Conference on Marine Pollution, 1973”,

The following countries sent delegations to the conference:

- Argentina
- Australia
- Bahrain
- Belgium
- Brazil
- Bulgaria
- Belorussian Soviet Socialist Republic
- Canada
- Chile
- Cuba
- Cyprus
- Denmark
- Dominican Republic
- Ecuador
- Egypt
- Finland
- France
- German Democratic Republic
- Germany
- Federal Republic of Ghana
- Greece
- Haiti
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Italy
- Ivory Coast
- Japan
- Jordan
- Kenya
- Khmer Republic
- Kuwait
- Liberia
- Libyan Arab Republic
- Madagascar
- Mexico
- Monaco
- Morocco
- Netherlands
- New Zealand
- Nigeria
- Norway
- Panama
- Peru
- Philippines
- Poland
- Portugal
- Republic of Korea
- Romania
- Saudi Arabia
- Singapore
- South Africa
- Spain
- Sri Lanka
- Sweden
- Switzerland
- Thailand
- Trinidad and Tobago
- Tunisia

- Ukrainian Soviet Socialist Republic
- Union of Soviet Socialist Republics
- United Arab Emirates
- United Kingdom of Great Britain and Northern Ireland
- United Republic of Tanzania
- United States of America
- Uruguay
- Venezuela

The following countries were represented by observers at the conference:

- Colombia
- Jamaica
- Malawi
- Oman
- Republic of Viet-Nam
- Turkey
- Yugoslavia
- The Government of Hong Kong



The following organizations in the United Nations system sent representatives to the conference at the invitation of the Assembly:

- United Nations
- United Nations Environment Program
- Food and Agriculture Organization
- United Nations Educational, Scientific and Cultural Organization
- International Bank For Reconstruction and Development
- International Atomic Energy Agency

The following inter-governmental organizations sent observers to the conference:

- European Economic Community
- International Institute for the Unification of Private Law

The following non-governmental organizations sent observers to the conference:

- International Chamber of Shipping
- International Organization of Standardization
- International Electro technical Commission
- International Union of Marine Insurance
- International Association of Ports and Harbors
- The Baltic and International Marine Conference
- International Association of Classification Societies
- International Law Association
- European Council of Chemical Manufacturers Federation
- Oil Companies International Marine Forum
- International Ship-owners Association
- Friends of the Earth International

The conference elected Mr. S. V. Bhave, Head of the Indian delegation as President of the conference.

The vice-Presidents of the conference were elected, as follows:

- Mr. R.M Gowland (Argentina)

- H.E. Mr. Raffaelli (Brazil)
- The Hon. Jack Davis (Canada)
- Dr. M. Oporto (Cuba)
- Mr. M.A. El-Sammak (Egypt)
- Mr. J.P. Cabouat (France)
- Dr. H. Rentner (German Democratic Republic)
- Dr. G. Breuer (Germany)
- H.E. Mr. H.V.H. Sekyi (Ghana)
- Mr. M. Sjadzali (Indonesia)
- Mr. H. Afshar (Iran)
- Mr. K.G. Loukou (Ivory Coast)
- H.E. Mr. S. Toukan (Jordan)
- Mr. E. Dinga (Kenya)
- Mr. N.A. Al-Nakib (Kuwait)
- Mr. M. Ramarozaka (Madagascar)
- Dr. Vizcaino Murray (Mexico)
- Captain D.W. Boyes (New Zealand)
- Mr. S. Perkowicz (Poland)
- H.E. Mr. G. Nhigula (United Republic of Tanzania)
- Mr. V. Tikhonov (USSR)
- Mr. J.N Archer (United Kingdom)

The 1973 convention would incorporate the amended regulations contained in OILPOL 1954 But the Convention was also intended to address other forms of pollution from ships and therefore other annexes covered chemicals, harmful substances carried in packaged form, sewage and garbage. The 1973 Convention also included two Protocols dealing with Reports on Incidents involving Harmful Substances and Arbitration

Progress on ratifying the Convention though, turned out to be slow partly due to technical problems in ratifying Annex II and the non-ratification of MARPOL became

a primary concern. At the same time, a series of tanker accidents in 1976-1977, mostly in or near the United States waters and including the stranding of the Argo Merchant, generated demands for more austere action to curb accidental and operational oil pollution.

The United States took the lead in asking the IMO Council, in May 1977, to consider adopting further regulations on tanker safety. The Council agreed to convene a Conference in February 1978 – the Conference on Tanker Safety and Pollution Prevention. A working group met in May, June and July, while a combined MSC/MEPC met in October, to arrange basic documents for the Conference.

## CHAPTER 5: ARGO MERCHANT

MV Argo Merchant, a ship of 18,743 tons and 644 ft in length, was a Liberian-flagged oil tanker built by Howaldtswerke in Hamburg, Germany in 1953, infamous for running aground and subsequent sinking southeast of Nantucket Island, Massachusetts, causing one of the largest marine oil spills in history. Throughout the vessel's troubled past, she was involved in more than a dozen major shipping incidents including two other groundings; once in Indonesia and again in Sicily and a collision in Japan though the ship at the time bore different names. Because of her eventful career and sinking, Argo Merchant was featured in the "worst ship" category in the 1979 publication, *The Book of Heroic Failures*.

In December 1976, the Argo Merchant was on a venture from Puerto La Cruz, Venezuela to Salem, Massachusetts, under the command of Capt. Georgios Papadopoulos. The tanker was carrying a winter's supply of heating fuel in the amount of 7.7 million gallons.

It was later concluded that the ship carried a broken gyro-compass, inadequate charts, two unqualified crew as helmsmen and an inaccurate radio direction finder. These problems came to an unfortunate confluence when the weather deteriorated. A winter storm generated high winds and 10-foot seas, driving them across the bow of *Argo Merchant*, which caused the ship to run aground on Middle Rip Shoal in position 41° 2' N, 69° 27' W about 25 nautical miles southeast of Nantucket, more than 24 miles off course.

Fearing destruction of the ship, the Captain requested permission to dump the cargo in an effort to refloat the vessel. Yet, permission was not granted by the salvage company responsible for the value of the cargo. Other methods of abbreviating damage by attempting to make the ship lighter, such as an Air Deliverable Anti-Pollution Transfer System (ADAPTS) and emergency pumps failed due to the weather conditions and the shallow waters. It had been hoped that the above emergency measures would minimize stress on the frame and keep the distressed tanker from breaking apart until the oil could be offloaded.

On the contrary the Argo Merchant remained heavily laden and inflexible in the turbulent water. Tug assistance failed and the weather continued to deteriorate so it slowly became clear that her structure was threatened. On the 16<sup>th</sup> of December the captain made the decision to evacuate the ship. Due to the captain's request and to the

worsening conditions, the U.S. Coast Guard, operating out of the Coast Guard air station on Cape Cod, Massachusetts, dispatched helicopters to rescue the 38 crew members.

The next day the *Argo Merchant* rotated and buckled. On 21 December, the ship broke apart and emptied its entire cargo of fuel oil into the sea, enough to heat 18,000 homes for a year. The bow section split forward of the bridge and capsized the next day, floating aimlessly a few hundred yards to the southeast. Eventually the Coast Guard sank the bow section, but the stern section remained aground.

Efforts to prevent environmental damage proved fruitless. Emergency crews tried to burn the *Argo Merchant* on site twice. On the 27<sup>th</sup> of December, boxes of water resistant, flammable material charged with jet fuel (Tullanox) were dropped by helicopter onto the ship, the boxes were ignited using timed grenades. Yet the fire did not spread as hoped.

On the 31<sup>st</sup> of December the second attempt was conducted this time on a large slick. A Coast Guard vessel aided by an aircraft, located a large, oval-shaped area of oil which broke into smaller circular patterns as the salvage boat approached and moved into position. Tullanox in the form of open bags was dropped into the sea. The efforts were unsuccessful, and the endeavor was terminated.

Oil slicks of almost 200,000 square feet developed and in some cases were 10 inches thick. The next spring, oil balls washed ashore on Nantucket. The oil was analyzed and compared to the cargo carried by the *Argo Merchant*, proving that the oil was identical. Yet, it could not be definitively determined, however, that these particular balls were part of the ship's load. Sediment samples taken in the area of the spill consistently showed oil contamination.

Northwesterly winds spared fisheries, coastal areas and beaches by blowing the oil offshore. Due to the direction in which the wind blew the oil, concern about damage focused on economically valuable fishing grounds in the area of Georges Bank. Fish, shellfish and plankton collected in that area proved oil contamination. Cod and pollack eggs were also contaminated. Seabirds, especially gulls, were fouled with oil.

The local population was distressed about the spill and the media kept the accident visible though information was often incorrect, giving the impression that there had been widespread, serious damage. Two salvage team command posts were consolidated in order to reduce the chaos of conflicting facts. Plus to assure the public that no permanent damage had been done the spill was carefully tracked as it moved away from the shore.

The public scrutiny was the reason that the accident became the center of intense scientific activity for a few months after the grounding took place. Ecological impact was evaluated by studying the migration of the oil, as well as the flora and fauna which were affected. Research vessels from the National Oceanic and Atmospheric Administration (NOAA) and the Woods Hole Oceanographic Institution performed special operations to determine the extent and progression of the spill itself. Government agencies collected water, shellfish, fish and sediment samples.

The outcome of the oil spill seems to have been fortunate in several aspects: - the density of the oil was low enough so that it did not sink and contaminate the bottom, the spill occurred in the winter when the biological activity, productivity, and fishing activities are relatively low and as mentioned earlier the winds were almost continuously offshore, preventing the oil from coming on the beaches. As an immediate result of the disaster, NOAA created a hazardous materials team to provide and coordinate future responses, funnel necessary information to the Coast Guard, and to develop standard methods of assessing oil spills.



## **CHAPTER 6: 1978 Conference on Tanker Safety and Pollution Prevention**

The 1973 International Convention for the Prevention of Pollution from Ships needed ratification by 15 countries, with a combined merchant fleet of not less than 50 percent of world shipping by gross tonnage, and by 1976, it had only received three ratifications by Jordan, Kenya and Tunisia which represented less than one percent of the world's merchant shipping fleet. This was despite the fact that countries could join to the Convention by only ratifying Annexes I (oil) and II (chemicals). Annexes III to V, which cover harmful goods in packaged form, sewage and garbage, were optional. It began to look as though the Convention might never enter into force, despite its major importance.

In 1978, in response to the tanker accidents which took place between 1976-1977, IMO held a Conference on Tanker Safety and Pollution Prevention in February 1978. In February 1978, the Conference was attended by delegates from 61 countries, observers from 3 countries and representatives from 17 international organizations - a total of 451 people. The Conference adopted a protocol to the 1973 MARPOL Convention, absorbing the original Convention and amplifying the requirements for tankers in order to make them less likely to pollute the aquatic environment.

Additional measures were also incorporated into the 1978 Protocol to the International Convention for the Safety of Life at Sea (SOLAS), 1974 involving tanker safety. The measures included the demand for inert gas systems (through which exhaust gases, which are low in oxygen and thus incombustible, are used to replace flammable gases in tanks) on all new tankers over 20,000 dwt and specified existing tankers. Requirements for steering gear of tankers, rigorous requirements involving the radar and other collision avoidance aids, and stricter regimes for surveys and certification were also included in the SOLAS Protocol.

In pursuance of implementing MARPOL as swiftly as possible, the Conference allowed that the Parties would have 3 years to implement Annex II of the convention starting from the date of entry into force of the protocol, in order to get countries to accept Annex I.

The 1978 MARPOL Protocol and the SOLAS Protocols were viewed as gargantuan steps in raising construction and equipment standards for tankers through more severe regulations. The commitment to push through the legislation and make the regulations mandatory was made clear by a number of nations, such as the United States, and

this helped in spurring on other maritime nations into ratifying the Convention due to their eagerness to protect their shipowners competitiveness.

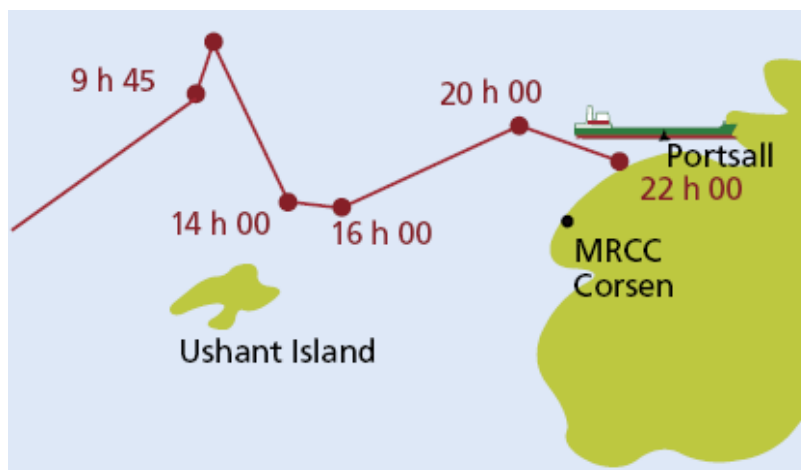
A month after the 1978 conference the Amoco Cadiz ran aground off Brittany in France, reminding the world of the need and importance for strict regimes to avoid and control oil pollution. Sufficient States had ratified MARPOL by October 1982, and the MARPOL 1973/78 Convention entered into force on 2 October 1983.



## CHAPTER 7: AMOCO CADIZ

The Amoco Cadiz was a very large crude carrier (VLCC) bearing a Liberian flag built by Astilleros Españoles, S.A. and owned by Amoco Transport Co. On the 16th of March 1978, the Amoco Cadiz, was heading from the Persian Gulf to Rotterdam with 227,000 tonnes of crude oil.

During a heavy storm the ship drifted towards the Breton coast after a failure of her steering system which prevented the vessel from maneuvering in the water. The crew attempted to repair the rudder, but the damage was too severe. The Cadiz notified other vessels to standby and later requested a tug. By 11:30 am, the tug Pacific responded and arrived at the scene an hour later. Due to the troublesome circumstances it took several hours for the Pacific to pass a towline over to the disabled Cadiz. By 2 pm, the towline had finally been passed over and connected to the ship, yet it snapped a few hours later. After several more attempts were made to reconnect, a towline was reconnected at just before 9 pm. In defiance of all the efforts made by the crews of both ships, the Amoco Cadiz ran aground at 10 pm near the port of Portsall, France.



The ship's hull near the stern ripped open which resulted in the flooding of the engine room. A short time later the vessel ran aground for the second time and this time the cargo tank was damaged and oil spilled into the ocean. The first oil slicks rapidly reached the shore. The captain of the Amoco Cadiz requested for all the crew to be taken off the ship except for himself and one other officer, at his request the French Navy dispatched helicopters and airlifted the crew to safety. The captain and the

officer which had remained aboard were also removed off the tanker by 5am the next day.



Over a period of two weeks the entire cargo of 223,000 tonnes of light Iranian and Arabian crude oil and 4,000 tonnes of bunker fuel was released into heavy seas. The oil was dragged by the currents and the winds resulting in the contamination of more than 320 km of the Brittany coastline, and had extended as far east as the Channel Islands. The residents of the damaged communities began a desperate fight against this disaster. The French media disseminated revealing images of an immense oil slick which left the nation speechless.

A sufficient offshore recovery operation was prevented by heavy seas and Strong winds. Less than 3,000 tonnes of dispersant chemicals were used, chalk was also used as a sinking agent, but resulted in transferring part of the problem to the sea bed. The at-sea efforts did little to reduce shoreline oiling. A variety of shore types were afflicted, along with cobble and shingle shores, sandy beaches, rocks, seawalls and jetties, salt marshes and mudflats. Skimmers were used for the removal of oil trapped against the shore but this proved to be a difficult task due to problems with debris and seaweed mixed with the oil. Greater success was accomplished with vacuum trucks

and agricultural vacuum units, yet most of the oil was removed by hand by more than 7,000 personnel. A substantial portion of the oil that didn't reach the shores, eventually became buried in sediments and entrapped in the low energy salt marshes and estuaries.

At the time, the Amoco Cadiz oil spill precipitated in the largest loss of marine life ever recorded after an oil disaster. Two weeks after the accident took place, millions of Dead Sea urchins, molluscs and other benthic species drifted ashore. Even though small crustacean and echinoderm populations almost utterly disappeared from some areas, populations of many species had recuperated within a year. Nearly 20,000 dead birds were recovered. Oyster cultivation in the estuaries was majorly affected and an estimated 9,000 tonnes were annihilated due to contamination and to safeguard market confidence. Other fisheries as well as seaweed gathering were also seriously affected in the short-term, as was tourism.

The cleanup activities which involved pressure-washing on rocky shores, as well as trampling and sediment removal on salt marshes created more organic impacts. The recovery of the salt marshes sadly took many years but on the bright side the rocky shores recovered relatively quickly. Long-term contamination was also caused by the failure to remove oil from temporary oil collection pits before inundation by the incoming tide. Various impact and cleanup lessons were taught by the Amoco Cadiz disaster and it remains one of the most thoroughly studied oil spills in history.



Even though the accident was over, a gigantic legal struggle was just beginning. The State, the local authorities and the victims of the pollution were aware that a trial in France would not impel Amoco Transport to pay, so they decided to prosecute its parent company, Amoco International Oil Company, and went to New York and Chicago for this purpose. On one side was the French State, the French administrative divisions, ninety villages, thousands of people gathered in associations, a few scientists and a handful of advocates. On the other side was the Amoco group with hundreds of lawyers and experts.

Following a fourteen year battle, the first decision was made in 1992 with additional amendments in 1992, Amoco finally paid. The French State and the local authorities incurred great expenses and had to provide half a million documents for the court. First, they claimed 152 million euros. The decision rendered in 1990 awarded them 51 million euros which meant 105 million euros with interest. The rectification decision in 1992, which revalued both damages and the late interest rate, raised the total amount to 190 million euros. In spite of aspirations, damages to the ecology were never paid.

## CHAPTER 8: ANNEX I- Prevention of pollution by oil

MARPOL Annex I, the first implementation made by MARPOL 73/78 is one of the most important international marine environmental conventions. The convention was created in order to minimize pollution of the oceans by vessels. The convention's purpose is to protect the marine environment through the eradication of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances. Annex I was first introduced during the 1973 international Convention for the Prevention of Pollution from Ships and it was additionally pushed to be enforced during the 1978 conference on Tanker Safety and Pollution Prevention. Annex I, was finally enforced on the 2<sup>nd</sup> of October 1983, and it details the prevention of pollution by oil and oily water.

The first half of Annex I has to do with engine room waste. There is a lot of new equipment and technology which was developed to prevent waste such as:

- Oily Water Separators (OWS).
- Oil Content Meters (OCM).
- Port reception facilities.

The second half of Annex I has more to do with cleaning the tanks and cargo areas. A technology that has greatly helped improve efficiency and environmental protection in these areas is the Oil Discharge Monitoring Equipment (ODME).

### 8.1 Definitions

*Oily Water Separators (OWS):*



The function of oily water separator is to separate maximum amount of oil particles from the water to be discharged overboard from engine room or cargo hold bilges, oil tanks and oil contaminated spaces. As per the regulation, the oil content in the water

processed from the OWS must be less than 15 parts per million of oil.

*Oil Content Meters (OCM):*



The OCM continuously monitors how much oil is in the water that is pumped out the discharge line of the OWS system. The OCM will not allow the oil concentration of the exiting water to be above the MARPOL standard of 15 ppm. This standard was first adopted in 1977 with Resolution A.393(X) which was

published by IMO.

*Port reception facilities:*

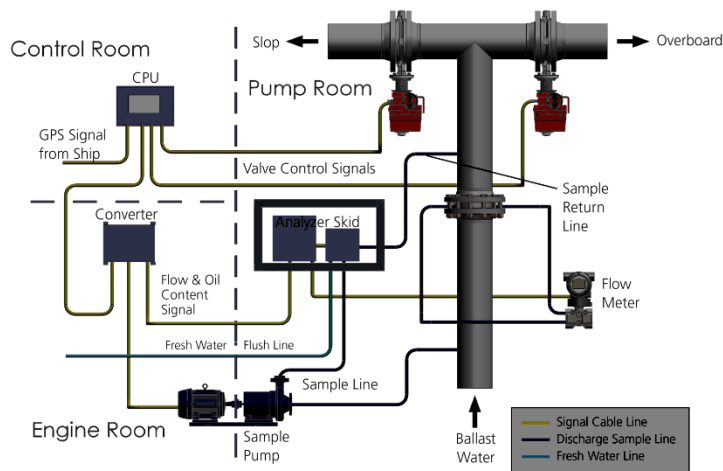


Are a place that international shipping ports must provide to collect residues, oily mixtures, and garbage generated from an ocean-going vessel.

Contaminants generated by ships cannot be discharged directly to the ocean. According to MARPOL 73/78 they must be

collected by the Port reception facilities all around the world. The Port reception facility must be able to receive dirty oil and other contaminants, and also provide quick and efficient services.

## *Oil Discharge Monitoring Equipment (ODME):*



Oil Discharge Monitoring Equipment (ODME) is based on a measurement of oil content in the ballast and slop water, to measure conformance with regulations. The

apparatus is equipped with a GPS, data recording functionality, an oil content meter and a flow meter. By use of data interpretation, a computing unit will be able to allow the discharge to continue or it will stop it using a valve outside the deck.

## **8.2 Contents of Annex 1**

### Chapter 1 – General

- Regulation 1 – Definitions.
- Regulation 2 – Applications.
- Regulation 3 - Exemptions and waivers.
- Regulation 4 – Exemptions.
- Regulation 5 – Equivalents.

### Chapter 2 - Surveys and certification

- Regulation 6 – Surveys.
- Regulation 7- Issue of Endorsement of a Certificate.
- Regulation 8 - Issue or endorsement of a Certificate by another Government.
- Regulation 9 - Form of Certificate.

- Regulation 10 - Duration and validity of Certificate.
- Regulation 11 - Port State control on operational requirements.

### Chapter 3 - Requirements for machinery spaces of all ships

#### Part A – Construction

- Regulation 12 - Tanks for oil residues (sludge).
- Regulation 13 - Standard discharge connection.

#### Part B – Equipment

- Regulation 14 - Oil filtering equipment.

#### Part C - Control of operational discharge of oil

- Regulation 15 - Control of discharge of oil.

A: Discharges outside special areas.

B: Discharges in special areas.

C: Requirements for ships of less than 400 gross tonnage in all areas except the Antarctic area.

D: General requirements.

- Regulation 16 - Segregation of oil and water ballast and carriage of oil in forepeak tanks.
- Regulation 17 - Oil Record Book, Part I - Machinery space operations.

### Chapter 4 - Requirements for the cargo areas of oil tankers

#### Part A – Construction

- Regulation 18 - Segregated ballast tanks.
- Regulation 19 - Double hull and double bottom requirements for oil tankers delivered on or after 6 July 1996.
- Regulation 20 - Double hull and double bottom requirements for oil tankers delivered before 6 July 1996.
- Regulation 21 - Prevention of oil pollution from oil tankers carrying heavy grade oil as cargo.
- Regulation 22 - Pump-room bottom protection.



- Regulation 23 - Accidental oil outflow performance.
- Regulation 24 - Damage assumptions.
- Regulation 25 - Hypothetical outflow of oil.
- Regulation 26 - Limitations of size and arrangement of cargo tanks.
- Regulation 27 - Intact stability.
- Regulation 28 - Subdivision and damage stability.
- Regulation 29 - Slop tanks.
- Regulation 30 - Pumping, piping and discharge arrangement.

#### Part B – Equipment

- Regulation 31 - Oil discharge monitoring and control system.
- Regulation 32 - Oil/water interface detector.
- Regulation 33 - Crude oil washing requirements.

#### Part C - Control of operational discharge of oil

- Regulation 34 - Control of discharge of oil.
  - A: Discharges outside special areas
  - B: Discharges in special areas
  - C: Requirements for oil tankers of less than 150 gross tonnage
  - D: General requirements
- Regulation 35 - Crude oil washing operations.
- Regulation 36 - Oil Record Book, Part II - Cargo/ballast operations.

#### Chapter 5 - Prevention of oil pollution arising from an oil pollution incident

- Regulation 37 - Shipboard oil pollution emergency plan.

#### Chapter 6 - Reception facilities

- Regulation 38 - Reception facilities.

#### Chapter 7 - Special requirements for fixed or floating platforms

- Regulation 39 - Special requirements for fixed or floating platforms.

## Appendices to Annex I

- Appendix I - List of oils.
- Appendix II - Form of IOPP Certificate and Supplements.
- Appendix III - Form of Oil Record Book
- Unified Interpretations of Annex 1

## Appendices to Unified Interpretations of Annex I

- Appendix 1 - Guidance to Administrations concerning draughts recommended for segregated ballast tankers below 150 m in length.
- Appendix 2 - Interim recommendation for a unified interpretation of regulations 18.12-18.15 "Protective location of segregated ballast spaces'.
- Appendix 3 - Connection of small diameter line to the manifold valve.
- Appendix 4 - Specifications for the design, installation and operation of a part flow system for control of overboard discharges.
- Appendix 5 - Discharges from fixed or floating platforms.

### **8.3 The 1984 Amendments**

Even though Annex I had entered into force, there was still work to be done in reviewing the Convention and confirming it was being implemented properly. The first amendments to MARPOL 73/78 were adopted in 1984 and they entered into force in 1986. They were created to ameliorate and strengthen the existing regulations, such as Regulation 25 regarding subdivision and stability - intended to ensure that tankers can survive a certain amount of damage. Some regulations were overlooked or moderated. For example the transportation of ballast water in cargo tanks was now allowed in certain conditions, this was based on studies showing that this was appropriate.

### **8.4 The 1991 Amendments**

In 1991, further amendments were introduced to Annex I, which entered into force in 1993. The amendments required oil tankers and other ships to carry an oil pollution

emergency plan (SOPEP). SOPEP stands for Ship oil pollution emergency plan and as per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan according to the norms and guidelines laid down by IMO under MEPC (Marine Environmental Protection Committee) act. The Gross tonnage requirement for oil tanker, according to SOPEP, reduces to 150 GT because oil itself is a kind of cargo which doubles the risk of oil pollution.

The Master and the chief officer of the ship are in charge of the implementation of SOPEP on board. The emergency plan also describes how the master, officers and the crew of the ship should tackle various oil spill scenarios that may occur. As for oil tankers the action plan widens concerning cargo handling and cargo tanks containing huge amounts of oil.



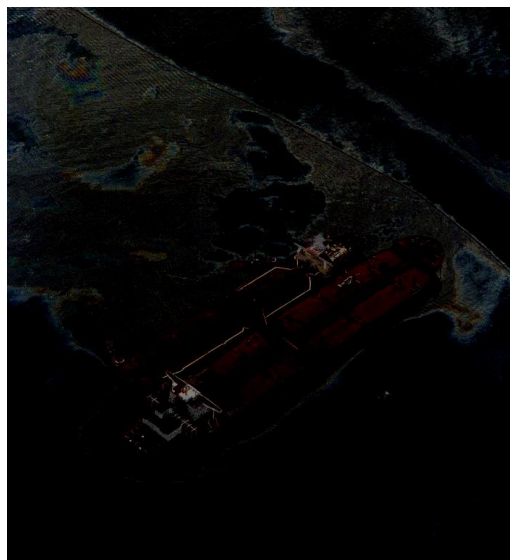
SOPEP contains:

- The action plan contains duty of each crew member at the time of spill, including emergency muster and actions.
- SOPEP contains the general information about the ship and the owner of the ship etc.

- Steps and procedure to contain the discharge of oil into the sea using SOPEP equipment.
- On board Reporting procedure and requirement in case of oil spill is described.
- Authorities to contact and reporting requirements in case of oil spill are listed in SOPEP. Authorities like port state control, oil clean up team etc. are to be notified.
- SOPEP includes drawing of various fuel lines, along with other oil lines on board vessel with positioning of vents, save all trays etc.
- General arrangement of ship is also listed in SOPEP, which includes location of all the oil tanks with capacity, content etc.
- The location of the SOPEP locker and contents of the locker with a list of inventory.

### **8.5 The 1992 amendments - prevention of oil pollution in the event of collision or stranding**

The Exxon Valdez, in 1989, ran aground in the northeastern portion of Prince William Sound, spilling about one-fifth of its cargo. It was the largest crude oil spill at the time in US waters. The spill probably earned the biggest media coverage to date. The U.S. public demanded action and it duly got it. The United States introduced its Oil Pollution Act of 1990 (OPA 90), which made it obligatory for all tanker ships travelling to U.S. ports to have double hulls.

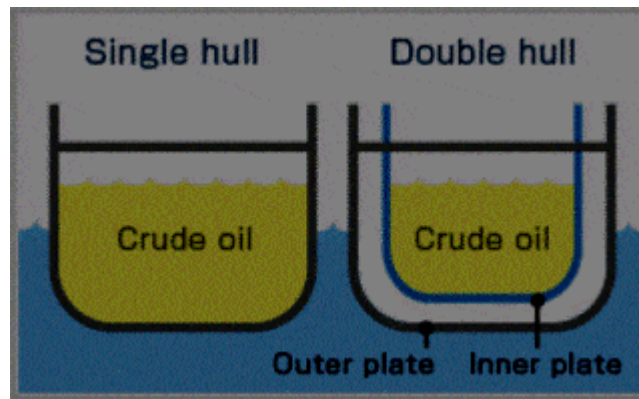


The United States also went to IMO, asking for double hulls to be made a compulsory requirement of MARPOL. The effect of the Exxon Valdez spill was duly noted by IMO and MEPC and they immediately began discussions on how the U.S. suggestions could be executed. There was resistance from the oil industry, as on previous occasions, to double hulls being made obligatory, mainly due to the cost of modifying existing tankers.

During that time, several IMO Member States stated that other designs should be approved as equal and that measures for already existing ships should also be contemplated. In 1991 a study was funded by the tanker ship and oil industry and carried out by IMO. The study looked into the comparative performances of the double-hull and mid-height deck tanker designs. It ended in January 1992 and concluded that the two designs could be considered as equal, even though the two designs give different outflow efficiency under specific conditions. Ultimately, MEPC agreed to make double hulls or alternative designs mandatory "provided that such methods ensure the same level of protection against pollution in the event of a collision or stranding", however the alternative design methods must be approved by the MEPC.

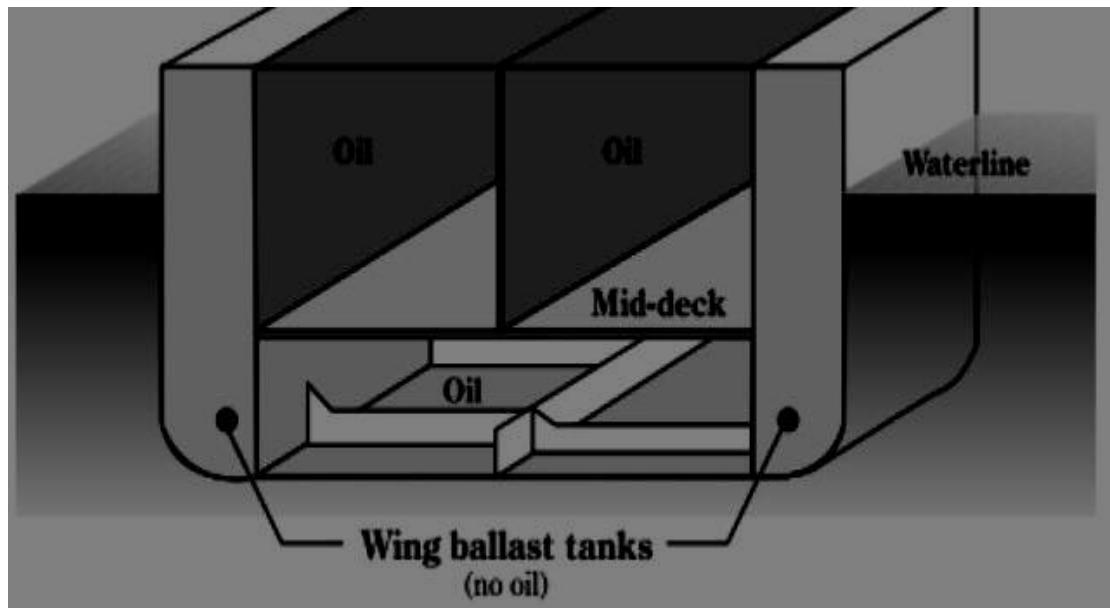
Amendments to Annex I of MARPOL 73/78 were adopted. The amendments introduced two new regulations, 13F and 13G, relating to standards for design and construction of new and existing oil tankers.

Regulation 13F was adopted in March 1992 and entered into force in July 1993. This regulation concerns new tankers (delivered on or after the 6<sup>th</sup> of July 1996), while already existing tankers must conform to the requirements of regulation 13F not later than 30 years after their date of delivery. Tanker ships between 600 dwt and 5,000 dwt must be fitted with double bottom or double sides with a separated space that has to be at least 0.76 meters. Tanker ships of 5,000 dwt and above are required to have a double hull, which means double bottom and double sides, separated by a space of up to two meters.



Tankers of 5,000 dwt and above must be constructed with double bottoms and wing tanks extending the full depth of the ship's side. Tankers of 600 dwt and above but less than 5,000 dwt, must be constructed with double bottom tanks, but the capacity of each cargo tank is limited to 700 cubic meters, unless they are fitted with double hulls.

The regulation also permits as an alternative design, mid-deck height tankers. Under the so called mid-deck the pressure within the cargo tank does not exceed the external hydrostatic water pressure. Tankers constructed using this design are consisted of double sides but do not have a double bottom. Rather than having a double bottom, the ship has another deck, the “mid-deck”, which is installed inside the cargo tank with the venting arranged so that there is an upward pressure on the bottom of the hull. The outflow of oil is intercepted by the hydrostatic pressure. This occurs by loading the cargo in a way that the external water pressure is higher than the hydrostatic pressure at the bottom of the tank. In the case that the tank is ruptured due to grounding, sea water flows in instead of oil flowing out.



The MEPC also adopted Regulation 13G which concerns already existing tankers. The regulation, makes preparations for an enhanced program of inspections to be implemented, specifically for tanker ships more than five years old.

Regulation 13G also allowed for future recognition of other operational or structural arrangements as surrogates to the protective measures in the Regulation, such as hydrostatic balance loading (HBL). It was foreseen that older tankers which could not be revamped to the new standard for economic reasons, would obviously be scrapped. The MEPC adopted a resolution suggesting that Governments of member states should take initiatives in co-operation with the shipbuilding and shipping industries, to create scrapping facilities at a world-wide level. This resolution's ambition was to promote development and research programs and also to provide technical assistance to developing countries in developing ship scrapping facilities.

The MEPC also endorsed amendments to MARPOL, which severely reduced the amount of oil which could be discharged into the sea caused by routine operations, forbidding non-tankers to discharge oily wastes if the oil content exceeds 15 parts per million and allowing tankers to discharge oily mixtures only at a rate of 30 liters per nautical mile (and only outside special areas).

## **8.6 The 1994 amendments - implementation**

The MEPC adopted amendments to MARPOL in November 1994, which aimed to improve the implementation of the Convention, making it plausible for ships to be inspected during their stay at ports of other members of MARPOL, to make certain that the crew of the ship which is being inspected is fit to carry out vital shipboard procedures relating to marine pollution prevention. The amendments, entered into force on the 3<sup>rd</sup> of March 1996 and also applied to Annex II concerning pollution by noxious liquid substances, Annex III containing regulations for the prevention of pollution by harmful substances in packaged form and Annex V which deals with garbage.

Alike amendments were made in May 1995 to the International Convention for the Safety of Life at Sea (SOLAS). A number of IMO Conventions include provisions for port State control inspections but formerly these have been restricted primarily to certification and the physical condition of the ship and the ship's equipment. Extending port State control to operational requirements was viewed as a crucial way of enhancing the efficiency with which anti-pollution conventions are implemented and international safety is achieved.

## **8.7 The 1997 Amendments - intact stability and special areas**

MEPC adopted a new Regulation 25A to Annex 1, In September 1997, specifying intact stability criteria for double hull tankers. The amendments, which enter into force on the 1<sup>st</sup> of February 1999, were rendered necessary after previous experience had shown that a small number of double hull tankers were being constructed without enough bulkheads to maintain stability. The aforementioned regulation defines the criteria for achieving intact stability for double hull tankers. Another amendment makes the North West European waters a "special area", thereby prohibiting discharge into the sea of oil or oily mixture from any oil tanker and ship over 400 gt in the North Sea and its approaches, the Irish Sea and its approaches, the Celtic Sea, the English Channel and its approaches and part of the North East Atlantic immediately to the West of Ireland, from the time when littoral States have made provision for sufficient reception facilities. The countries involved, informed the MEPC in April



1998, that reception facilities were adequate and that the North West European Waters special area should take effect as from the 1<sup>st</sup> of August 1999.

### **8.8 Achievements prior to the 2017 Amendments**

In 1990, MARPOL 73/78 was credited with making "a substantial positive impact in decreasing the amount of oil that enters the sea" by the National Research Council Marine Board of the United States. A study conducted by the Board showed that in 1981, approximately 1,470,000 tons of oil entered the world's oceans as a result of shipping operations. Most of it came from routine operations, such as discharges of machinery wastes and tank washings from oil tankers (the latter alone contributed (700,000 tons). Accidental pollution contributed to less than 30% of the total.

It was estimated that oil pollution from ships had been reduced to 568,800 tons by 1989. Tanker operations contributed to only 158,000 tons of this.

Furthermore, although the 1978 Protocol did not enter into force until 1983, many of its requirements were nevertheless already being implemented. The "load on top" system, for example, had been implemented since 1978 and was installed on many tankers because it reduced the amount of oil wasted during routine operations thereby increasing profits. The "new ship" and "new tanker" definitions included in the original 1973 Convention and the 1978 Protocol also meant that all tankers built after those dates already complied with MARPOL 73/78 requirements.

Today, tankers safely transport 1/3 of the crude oil around the world by sea including 50 percent of US oil imports. MARPOL measures introduced after major accidents have contributed to the fact that today a tanker is more likely to be well constructed and operated. The fact that MARPOL measures have essentially been triggered by disasters is not necessarily a bad thing. The ramifications of the public outcry over oil slicks or tar balls on beaches have been to ensure that the oil majors who transport crude oil around the world are prepared to invest in safety and pollution prevention features - because an accident, apart from its costs on human life or physical terms - could cost them dearly in negative publicity.

### **8.9 The 2017 Amendments**

MEPC adopted the amendments to Regulation 12 of Annex I of the MARPOL Convention.. The amendments entered into force on the 1<sup>st</sup> of January 2017. The

amendments have re-structured the provisions of regulation 12 of MARPOL Annex I corresponding to tanks for oil residues (sludge) on the requirements for discharge connections and common piping arrangement to make certain that oil residues are properly jettisoned.

Oil residue may be disposed of directly from the oil residue tank(s) to reception facilities through the standard discharge connection referred to in regulation 13, or to any other approved means of disposal of oil residue, such as an incinerator, auxiliary boiler suitable for burning oil residues or other acceptable means which shall be annotated in item 3.2 of the Supplement to International Oil Pollution Prevention (IOPP) Certificate Form A or B.

Oil residue (sludge) tank(s) shall be provided and:

- shall be of adequate capacity, having regard to the type of machinery and length of voyage, to receive the oil residues (sludge) which cannot be dealt with
- shall be provided with a designated pump that is capable of taking suction from the oil residue (sludge) tank(s) for disposal of oil residue (sludge)
- shall have no discharge connections to the bilge system, oily bilge water holding tank(s), tank top or oily water separators, except that:
  1. the tank(s) may be fitted with drains, with manually operated self-closing valves and arrangements for subsequent visual monitoring of the settled water, that lead to an oily bilge water holding tank or bilge well, or an alternative arrangement, provided such arrangement does not connect directly to the bilge discharge piping system; and
  2. the sludge tank discharge piping and bilge-water piping may be connected to a common piping leading to the standard discharge connection referred to in regulation 13; the connection of both systems to the possible common piping leading to the standard discharge connection referred to in regulation 13 shall not allow for the transfer of sludge to the bilge system
- shall not be arranged with any piping that has direct connection overboard, other than the standard discharge connection referred to in regulation 13 and

- shall be designed and constructed so as to facilitate their cleaning and the discharge of residues to reception facilities.

Ships constructed before the 1<sup>st</sup> of January 2017 shall be arranged to comply with paragraph 3.3 of this regulation not later than the first renewal survey carried out on or after the 1<sup>st</sup> of January 2017.

## **CHAPTER 9: ANNEX II - Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk**

The transportation of chemicals and liquid raw materials for the food and animal feed industries pose a major threat to the marine environment. In order to reduce these risks MARPOL annex II entered into force on the 6th of April 1987 with provisions for the design and construction, as well as the equipment and the operation of chemical tankers. This is instrumental in the environmentally sound transportation of noxious liquid substances in bulk.

The basic principles of MARPOL Annex II are:

- Safe containment of the noxious liquid substances.
- Dilution of discharges.
- Limitation of discharges into the sea.

### **9.1 Contents of Annex II**

#### Chapter 1 – General

- Regulation 1 – Definitions.
- Regulation 2 - Application.
- Regulation 3 – Exceptions.
- Regulation 4 – Exemptions.
- Regulation 5 – Equivalentents

#### Chapter 2 - Categorization of noxious liquid substances

- Regulation 6 - Categorization and listing of noxious liquid substances and other substances.

#### Chapter 3 - Surveys and certification

- Regulation 7 - Survey and certification of chemical tankers.
- Regulation 8 – Surveys.
- Regulation 9 - Issue or endorsement of Certificate.
- Regulation 10 - Duration and validity of Certificate.

#### Chapter 4 - Design, construction, arrangement and equipment

- Regulation 11 - Design, construction, equipment and operations.
- Regulation 12 - Pumping, piping, unloading arrangements and slop tanks.

#### Chapter 5 Operational discharges of residues of noxious liquid substances

- Regulation 13 - Control of discharges of residues of noxious liquid substances.
- Regulation 14 - Procedures and Arrangements Manual.
- Regulation 15 - Cargo Record Book.

#### Chapter 6 - Measures of control by port States

- Regulation 16 - Measures of control.

#### Chapter 7 - Prevention of pollution arising from an incident involving noxious liquid substances

- Regulation 17 - Shipboard marine pollution emergency plan for noxious liquid substances.

#### Chapter 8 - Reception facilities

- Regulation 18 - Reception facilities and cargo unloading terminal arrangements.

#### Appendices to Annex II

- Appendix 1 - Guidelines for the categorization of noxious liquid substances.
- Appendix 2 - Form of Cargo Record Book for ships carrying noxious liquid substances in bulk.
- Appendix 3 - Form of International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk.
- Appendix 4 - Standard format for the Procedures and Arrangements Manual.
- Appendix 5 - Assessment of residue quantities in cargo tanks, pumps and associated piping.
- Appendix 6 - Prewash procedures.

- Appendix 7 - Ventilation procedures

## **9.2 Background**

The transportation by sea of liquid chemicals in bulk developed in accordance to the increasing number of by- products being produced by the petroleum refineries. Since World War II, chemical tankers have developed alongside the growth in the chemicals industry.

Initially, oil tankers were fitted to transport liquid chemicals, by installing special tanks, double bottoms and structural and piping arrangements. However, as the range of products from the chemicals trade increased, chemical tankers became more complex.

The first purpose-built chemical tankers made their debut in the early 1960s and were designed to offer maximum protection to the cargo and to the crew, due to the nature of the chemicals concerned. Chemical tankers are predominantly smaller in size than oil tankers, ranging from 500 gross tonnage to 40,000 gross tonnage, and are often of extremely complex constructions, designed to transport various different substances simultaneously, each with different properties and requiring different handling.

The main chemicals carried in bulk include heavy chemicals; molasses, alcohols, vegetable oils, animal fats, petrochemical products and coal tar products

## **9.3 Chemical tanker safety**

During the 1960s the matter of chemical tanker safety was first brought up in the IMO forum resulting in the formation of a new Sub-Committee on Ship Design and Equipment. Its initial task was to consider the construction and equipment of ships carrying chemicals in bulk.

The sub-committee's first session was held in January 1968 and it was agreed that the preparation of a code was needed to cover the equipment, design criteria and construction of chemical tankers. As an inaugural measure, it drew up a short term recommendation for existing chemical tankers which was issued as an MSC notice in 1970.

The IMO Assembly, in October 1971 adopted the Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (BCH Code). The code specified the agreed international standards for the carriage and equipment

prerequisites for such cargoes. The Code applied to ships built on or after the 12th of April 1972, although at the time it was not mandatory. Despite that, several countries with a significant number of chemical tankers in their fleet implemented the Code into their national legislation.

The Code set out requirements on ship capability for enduring damage and cargo tank location, according to the type of products carried:

- Type I ships would be designed to carry products requiring maximum preventive measures to preclude escape of cargo
- Type II for products requiring significant preventive measures
- Type III covered products requiring a moderate degree of containment.

The code listed more than 100 chemicals with the corresponding ship type, based on the evaluation of those chemicals according to a list of specified hazards which included the flashpoint of the chemical and health hazards.

The Code did not address the pollution aspects of transporting chemicals in bulk. IMO's Sub-Committee on Marine Pollution had already begun to prepare regulations on the control of discharges from chemical tankers, to be incorporated into the planned convention on marine pollution.

#### **9.4 1973 MARPOL Convention**

While the BCH Code addressed the design and construction of chemical tankers to ensure safe transport of chemical substances, Annex II of the 1973 MARPOL Convention was concerned with preventing or reducing the operational discharge and accidental release of these substances into the sea.

The regulations were the first to focus on operational discharges of chemicals from operations such as tank washing. However, the regulations required Governments to guarantee reception facilities would be available to receive chemical residues - and this was seen as a dilemma even while States were adopting the convention at the 1973 Conference.

Annex I was based on the belief that all oils are harmful substances and should be prevented from entering the sea, whereas Annex II recognized the wide diversity in biological and physical properties of the substances it covered. As a result, the

substances were divided into four categories which were classified A to D, according to the hazard they present to marine resources, human health and or amenities.

- Category A - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a major hazard to either marine resources or human health or cause serious harm to amenities or other legitimate uses of the sea and therefore justify the application of stringent anti-pollution measures. Examples are acetone cyanohydrin, carbon disulphide, cresols, naphthalene and tetraethyl lead.
- Category B - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify the application of special anti-pollution measures. Examples are acrylonitrile, carbon tetrachloride, ethylene dichloride and phenol.
- Category C - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a minor hazard to either marine resources or human health or cause minor harm to amenities or other legitimate uses of the sea and therefore require special operational conditions. Examples are benzene, styrene, toluene and xylene.
- Category D - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a recognizable hazard to either marine resources or human health or cause minimal harm to amenities or other legitimate uses of the sea and therefore require some attention in operational conditions. Examples are acetone, phosphoric acid and tallow.

The Annex also specified "other liquid substances" which were not included in Categories A, B, C or D and therefore represent no harm when discharged into the sea from tank cleaning or ballasting operations. These substances included coconut oil, ethyl alcohol, molasses, olive oil and wine.

A list of approximately 250 noxious liquid substances, with categorization, was given in Appendix II to the Annex. The discharge of these substances varies according to the hazards they present.



Category A substances can only be discharged into reception facilities - not even residues resulting from tank cleaning can be discharged into the sea. This is permitted for other categories, but only under strict controls. Category B substances, for example, can never be discharged in quantities greater than one cubic meter. No discharge of residues containing noxious substances is permitted within 12 miles of the nearest land in a depth of water of less than 25 meters. Even stricter restrictions apply in the Baltic Sea and Black Sea.

Parties to the Convention were required to issue detailed requirements for the operation, construction and design of chemical tankers which contain at least all the provisions of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk. Operations involving substances to which Annex II applies must be recorded in a Cargo Record Book, which can be inspected by the authorities of any Party to the Convention.

### **9.5 The 1978 Conference**

As had been predicted by some observers, the requirements in Annex II were making it difficult for several governments to ratify the Convention. As a result, it was agreed that Annex II would become effective three years after Annex I entered into force. This inspired governments to ratify the Convention, which entered into force on the 2nd of October 1983 thereby giving parties to the Convention until the 2nd of October 1986 to implement the regulations.

Nevertheless, it soon became apparent that Annex II was not only outdated in certain respects but also still presented considerable difficulties as far as implementation was concerned. A major problem with the implementation of Annex II arose from the original premise on which it was drafted, namely that the quantity of Category B or C chemicals remaining in a tank after unloading could be calculated. Provided that this calculated quantity was less than the upper limit validated by the Convention, the residue could be discharged into the wake of the ship with the provision that the resulting concentrations in the sea did not exceed a certain limit.

The application of the aforementioned criteria required further calculations to establish an appropriate speed and the under-water discharge rate for the chemical involved. This however, meant that the operation of a chemical carrier with parcels of various chemicals and considerable variability of physical properties and ambient temperature conditions would require that a member of the ship's crew would be

employed virtually full-time in calculating residue quantities and ascertaining discharge parameters.

Experience has shown that this complicated procedure described above could be avoided if the efficient stripping of tanks to a relatively insignificant residue level during unloading was made compulsory. Those smaller quantities of residues could then be discharged overboard without limitation or rate of discharge.

Another major problem of Annex II dealt with reception facilities, the provision of which was vital to the effective enforcement of the regulations. Reception facilities for chemicals are more costly and sophisticated than those designated for the reception of oily wastes, since the wastes they are required to handle are much more varied. Also there is little opportunity for recycling them as can be done with some oily wastes. The result being that governments and port authorities were apprehensive to provide such facilities, especially because the Convention itself was ambiguous as to whether the facilities should be provided in loading or unloading ports.

Other aspects of implementation were also a concern, for example developing monitoring equipment to ensure that chemicals are correctly diluted prior to being discharged into the sea. As a result, certain operational procedures had to be developed in order to limit the discharge rate to reduce harm to the environment.

In October 1982, the final modification required for entry into force of the 1978 MARPOL Protocol was registered with the IMO Secretary-General, and the Convention came into effect on the 2nd of October 1983. This meant that Annex II would become binding for Parties three years later, on the 2nd of October 1986 making it even more imperative that something be done promptly to ensure that the Annex could effectively be implemented.

In 1983, the IMO Assembly adopted arrangements and procedures for the discharge of noxious liquid substances which were called for according to various regulations of Annex II and these were applied on a trial basis by a number of IMO Member States. These trials indicated a number of obstacles in implementing Annex II, which were mainly associated with the problems already outlined in the previous paragraphs.

They included:

- The requirements were too complex and put a heavy burden on the crew of the ship.

- Measures of control were very limited and compliance with the standards depended entirely upon the willingness of the crew.
- There was a general lack of facilities for the reception of chemical wastes. Although provision of facilities themselves did not present great difficulties because the amount is small compared with oily wastes, treatment of wastes and ultimate disposal was a problem.

IMO consequently, prepared a number of crucial changes to Annex II which were formally adopted at an "expanded" meeting of IMO's Marine Environment Protection Committee in December 1985.

### **9.6 The 1985 amendment**

The 1985 amendments were created in order to encourage shipowners to improve cargo tank stripping efficiencies, and included a number of requirements to make sure that both new and existing chemical tankers minimize the amount of residues to be disposed of. Simultaneously, the amendments made it possible to adopt simplified procedures for the discharge of residues.

The amendments were also directed at reducing the quantities of B and C substances that were discharged into the sea by introducing a new regulation 5A on Pumping, unloading arrangements and piping. These amendments also required new ships (built after the 1st of July 1986) to be provided with pumping and piping arrangements so that the residue left after emptying a tank would be reduced to a specified minimum. Ships built prior to the 1st of July 1986 also had to ensure that pumping and piping arrangements restricted the amount of residue to specified limits.

As a result, the 1985 amendments were created in order to achieve reduction in the generation of wastes resulting from shipboard operations, thereby reducing marine pollution by noxious liquid substances from ships as well as drastically reducing the environmental problems ashore associated with the treatment and ultimate disposal of wastes received from ships. Furthermore, the amendments provided for improved possibilities for executing effective port State control, thereby ensuring full compliance with the provisions of the Annex.

In 1985, it was decided that the implementation date of the existing Annex II should also be delayed until the 6th of April 1987. Had this not been done, the Annex would have entered into force in October 1986 only to be changed in crucial areas, including

the Certificate and Cargo Record Book. This would have imposed a substantial burden on Administrations and the shipping community in general.

Another important aspect of the 1985 amendments to Annex II was to make the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) compulsory. This Code was designed to update and improve Code which was already in existence for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code) and had been made compulsory under the International Convention for the Safety of Life at Sea (SOLAS) through amendments to that Convention adopted in 1983.

The IBC Code applies to chemical tankers built on or after the 1st of July 1986 , whereas chemical tankers built before that date had to comply with the requirements of the existing BCH Code.

The 1985 MARPOL amendments also brought certification and survey requirements into line with Annex I (regulations 10-12), introduced a scheme for the mandatory pre-washing of cargo tanks (regulation 8), added a new regulation dealing with oil-like noxious liquid substances (regulation 14), revised the list of noxious and other substances appended to the Annex and updated the form of the Cargo Record Book (regulation 9).

## **9.7 Categorization of products for Annex II**

The classification of noxious liquid substances for Annex II was based on evaluations carried out by a special Working Group on the Evaluation of Harmful substances (EHS), set up by the joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP). The EHS Working Group has assessed substances according to a range of properties, including; bioaccumulation, tainting, acute aquatic toxicity, human health effects and potential damage to living resources.

This assessment procedure resulted in a GESAMP Hazard Profile for individual substances, which is used as a basis for defining pollution categories (and ship types) for substance transportation under Annex II. A revised list of chemicals in Annex II and in the International Bulk Chemical Code and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk were adopted in the

March 1989 amendments to MARPOL, which entered into force on the 13th of October 1990.

### **9.8 Review of Annex II**

The MEPC, in 1992 agreed to review all the provisions in Annex II. The intention was to simplify the requirements in order to encourage more widespread implementation of the Annex. MEPC also agreed to review the categorization system.

The decision to review the Annex entirely was influenced by a number of developments as follow.

Firstly, developments in ship technology meant that stripping of tanks had ameliorated to the extent that only trace amounts of residues would be left in tanks after unloading and as a result, the limits on the discharges of substances could also be substantially reduced.

Improvements in technology have enabled IMO to reconsider the amount of discharge permitted to enter the marine environment and allowed IMO to reconsider the number of defined pollution categories.

Another matter was improved comprehension of the environmental impact of chemicals on the marine environment. In the existing product categorization, Annex II placed quite alot of emphasis on acute aquatic toxicity, tainting of fish and bioaccumulation with associated harmful effects, however it was being acknowledged that other properties were equally important, such as chronic aquatic toxicity, and the effect on wildlife or seabed of substances that would sink or continuously float on the surface.

### **9.9 The 2007 Amendments**

The IMO's Marine Environment Protection Committee (MEPC) adopted a revised MARPOL 73/78 Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk in 2004 which came into effect on the 1st of January 2007 and applied to both new and existing ships. This revised Annex used a new four-category pollution system for noxious liquid substances; the existing A, B, C and D category system became X,Y and Z.

### **9.10 The 2014 Amendments**

The 2012 amendments to the IBC Code which were adopted by IMO Resolutions MSC.340(91) and MEPC.225(64), entered into force on the 1st of June 2014, and revised Chapter 17 (the summary of minimum requirements) and Chapter 18 (the list of products to which the Code does not apply). The amendments applied to new and existing vessels which had IBC/BCH Code Certificates of Fitness and Noxious Liquid Substances. Offshore supply vessels with certificates of Fitness in compliance with IMO Resolution A.673(16), as amended were also affected.

New certificates complying with these amendments had to be on board by the 1st of June 2014. All loading after this date had to be in accordance with the new certificates. When cargo was loaded before the 1st of June 2014 and unloaded after this date, the relevant IBC Code provisions at the time of loading should have applied until the cargo had been unloaded.

### **9.11 The 2016 Amendments**

The new requirements were introduced into the IBC Code by IMO in order to make the provision of a stability instrument compulsory on board all chemical tankers. The stability instrument must be capable of verifying compliance with intact and damage stability requirements.

## **CHAPTER 10: ANNEX III - Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form**

The aim behind the regulations contained in Annex III of MARPOL was to identify marine pollutants in order that they could be packed and stowed on board ships so as to minimize accidental pollution as well as to aid in recovery by using clear marks to distinguish them from other (less harmful) cargoes.

The rules on discharging harmful goods are straightforward, "Jettisoning of harmful substances carried in packaged form shall be prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea".

The Annex also stipulated that "Appropriate measures based on the physical, chemical and biological properties of harmful substances shall be taken to regulate the washing of leakages overboard, provided that compliance with such measures would not impair the safety of the ship and persons on board."

Annex III pertains to all ships carrying harmful substances in packaged form, freight containers, portable tanks or road and rail tank wagons. The regulations require the issuing of detailed standards on packaging, marking, labeling, documentation, stowage, quantity limitations, exceptions and notifications, for preventing or minimizing pollution by harmful substances.

Obstacles however, hampered the implementation of the Annex due to the lack of a clear definition of harmful substances carried in packaged form. This was remedied by amendments to the International Maritime Dangerous Goods Code (IMDG Code) to include marine pollutants.

The IMDG Code was first adopted by IMO in 1965 and lists hundreds of specific dangerous goods together with detailed advice on storage, packaging and transportation. The amendments extending the Code to cover marine pollutants, which entered into force in 1991, added the identifier "marine pollutant" to all substances classified as such. All packages containing marine pollutants must be marked with a standard marine pollutant symbol.

Simultaneously Annex III of MARPOL was also amended to make it clear that "harmful substances' are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code)."

Annex III was optional under the terms of the 1973 Convention which meant that States who had signed up to MARPOL 73/78 were not required to adopt the Annex at

the same time. Annexes IV and V were also optional and would enter into force 12 months later when not less than 15 States with combined merchant shipping tonnage of more than 50 percent of the world fleet had ratified them.

Annex III received sufficient ratifications by 1991 and entered into force on the 1<sup>st</sup> of July 1992. On the 1<sup>st</sup> of October 1998 it was ratified by 87 States, representing 79.13 percent of world merchant shipping.

### **10.1 Annex III today**

The main changes affecting Annex III today relate to the IMDG Code, rather than to any developments in the Annex itself. The Maritime Safety Committee (MSC) adopted Amendment 29 to the IMDG Code in May 1998, which was aimed at bringing the Code into line with the tenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, it came into effect on the 1<sup>st</sup> of January 1999, with a transitional period to the 1<sup>st</sup> of July 1999.

Amendment 29 also includes a revised classification of marine pollutants, based on the work carried out by GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) on hazard profiles.

Meanwhile, the IMDG Code was being reformatted to make it more user-friendly and easily comprehensible. The Code appeared in four volumes, but the reformatted Code appeared in two volumes: one covering the general introduction, with information about the nine classes of dangerous goods, packaging and portable tanks; the second incorporating the list of substances plus the index.

The two-volume Code is divided into seven parts:

**Volume 1** contains (parts 1, 2, 4, 5, 6 and 7 of the Code) with sections on:

- general provisions, definitions, training
- Classification
- Packing and Tank Provisions
- Consignment Procedures
- Construction and Testing of packaging's, IBCs, large packaging's, portable tanks, MEGCs and road tank vehicles



- Transport Operations

**Volume 2** contains: part 3 (Dangerous Goods List, special provisions and exceptions), appendix A (generic and N.O.S. Proper Shipping Names), appendix B (Glossary of terms) and an index.

**The Supplement** contains the following texts related to the IMDG Code:

- EMS Guide
- Medical First Aid Guide
- Reporting Procedures
- Packing Cargo Transport Units
- Safe Use of Pesticides
- INF Code

## **10.2 Regulations for the prevention of pollution by harmful substances carried by sea in packaged form**

### **Regulation 1**

#### *Application*

1 Unless expressly provided otherwise, the regulations of this Annex apply to all ships carrying harmful substances in packaged form.

.1 For the purpose of this Annex, "harmful substances" are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code) or which meet the criteria in the Appendix of this Annex.

.2 For the purposes of this Annex, "packaged form" is defined as the forms of containment specified for harmful substances in the IMDG Code.

2 The carriage of harmful substances is prohibited, except in accordance with the provisions of this Annex.

3 To supplement the provisions of this Annex, the Government of each Party to the Convention shall issue, or cause to be issued, detailed requirements on packing, marking, labeling, documentation, stowage, quantity limitations and exceptions for preventing or minimizing pollution of the marine environment by harmful substances.

4 For the purposes of this Annex, empty packaging's which have been used previously for the carriage of harmful substances shall themselves be treated as harmful substances unless adequate precautions have been taken to ensure that they contain no residue that is harmful to the marine environment.

5 The requirements of this Annex do not apply to ship's stores and equipment.

## **Regulation 2**

### *Packing*

Packages shall be adequate to minimize the hazard to the marine environment, having regard to their specific contents.

## **Regulation 3**

### *Marking and labeling*

1 Packages containing a harmful substance shall be durably marked or labelled to indicate that the substance is a harmful substance in accordance with the relevant provisions of the IMDG Code.

2 The method of affixing marks or labels on packages containing a harmful substance shall be in accordance with the relevant provisions of the IMDG Code.

## **Regulation 4**

### *Documentation*

1 Transport information relating to the carriage of harmful substances shall be in accordance with the relevant provisions of the IMDG Code and shall be made available to the person or organization designated by the port State authority.

2 Each ship carrying harmful substances shall have a special list, manifest or stowage plan setting forth, in accordance with the relevant provisions of the IMDG Code, the harmful substances on board and the location thereof. A copy of one of these documents shall be made available before departure to the person or organization designated by the port State authority.

### **Regulation 5**

#### *Stowage*

Harmful substances shall be properly stowed and secured so as to minimize the hazards to the marine environment without impairing the safety of the ship and persons on board.

### **Regulation 6**

#### *Quantity limitations*

Certain harmful substances may, for sound scientific and technical reasons, need to be prohibited for carriage or be limited as to the quantity which may be carried aboard any one ship. In limiting the quantity, due consideration shall be given to size, construction and equipment of the ship, as well as the packaging and the inherent nature of the substances.

### **Regulation 7**

#### *Exceptions*

1 Jettisoning of harmful substances carried in packaged form shall be prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea.

2 Subject to the provisions of the present Convention, appropriate measures based on the physical, chemical and biological properties of harmful substances shall

be taken to regulate the washing of leakages overboard, provided that compliance with such measures would not impair the safety of the ship and persons on board.

## **Regulation 8**

### *Port State control on operational requirements*

1 A ship when in a port or an offshore terminal of another Party is subject to inspection by officers duly authorized by such Party concerning operational requirements under this Annex.

2 Where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of pollution by harmful substances, the Party shall take such steps, including carrying out detailed inspection and, if required, will ensure that the ship shall not sail until the situation has been brought to order in accordance with the requirements of this Annex.

3 Procedures relating to the port State control prescribed in article 5 of the present Convention shall apply to this regulation.

4 Nothing in this regulation shall be construed to limit the rights and obligations of a Party carrying out control over operational requirements specifically provided for in the present Convention.



## **CHAPTER 11: ANNEX IV - Prevention of Pollution by Sewage from Ships**

The discharge of raw sewage into the sea can create a health hazard, while in coastal areas, sewage can also lead to oxygen depletion and an obvious visual pollution - a major problem for countries with large tourist industries.

The main sources of human-produced sewage are land-based - such as municipal sewers or treatment plants.

It is generally considered that on the high seas, the oceans are capable of assimilating and dealing with raw sewage through natural bacterial action and therefore the regulations in Annex IV of MARPOL prohibit ships from discharging sewage within four miles of the nearest land, unless they have in operation an approved treatment plant. Between 4 and 12 miles from land, sewage must be comminuted and disinfected before discharge.

Annex IV contains a set of regulations regarding the discharge of sewage into the sea from ships, including regulations regarding the ships' equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage, and requirements for survey and certification.

### **11.1 Shipboard Sewage Pollution Sources**

- drainage and other wastes from any form of toilets and urinals
  - drainage from medical premises (dispensary, sickbay, etc.) via wash basins, wash tubs and scuppers located in such premises
  - drainage from spaces containing living animals
  - other waste waters when mixed with the drainages defined above.
- (Regulations not applicable to the disposal of: drainage from dishwasher, shower, laundry, bath and Washbasin drains - grey water).

### **11.2 Ships application**

- new ships of  $\geq 400$  gross tons
- new ships  $< 400$  gross tons certified to carry over 15 persons

- (new ships: building contract or keel laid on/after 27 September 2003 or delivered on/after 27 September 2006)
- existing ships of  $\geq 400$  gross tons
- existing ships  $< 400$  gross tons certified to carry over 15 persons (on or after 27 September 2008)

### 11.3 Surveys

Every ship which, in accordance with regulation 2, is required to comply with the provisions of this Annex shall be subject to the surveys specified below:

- An initial survey before the ship is put in service or before the Certificate required under regulation 5 of this Annex is issued for the first time, which shall include a complete survey of its structure, equipment, systems, fittings, arrangements and material in so far as the ship is covered by this Annex. This survey shall be such as to ensure that the structure, equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of this Annex.
- A renewal survey at intervals specified by the Administration, but not exceeding five years, except where regulation 8.2, 8.5, 8.6 or 8.7 of this Annex is applicable. The renewal survey shall be such as to ensure that the structure, equipment, systems, fittings, arrangements and materials fully comply with applicable requirements of this Annex.
- An additional survey, either general or partial, according to the circumstances, shall be made after a repair resulting from investigations prescribed in paragraph 4 of this regulation, or whenever any important repairs or renewals are made. The survey shall be such as to ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are in all respects satisfactory and that the ship complies in all respects with the requirements of this Annex.

#### **11.4 Issue or endorsement of Certificate**

- An International Sewage Pollution Prevention Certificate shall be issued, after an initial or renewal survey in accordance with the provisions of regulation 4 of this Annex, to any ship which is engaged in voyages to ports or offshore terminals under the jurisdiction of other Parties to the Convention. In the case of existing ships this requirement shall apply five years after the date of entry into force of this Annex.
- Such Certificate shall be issued or endorsed either by the Administration or by any persons or organization\* duly authorized by it. In every case, the Administration assumes full responsibility for the Certificate.

#### **11.5 Issue or endorsement of a Certificate by another Government**

- The Government of a Party to the Convention may, at the request of the Administration, cause a ship to be surveyed and, if satisfied that the provisions of this Annex are complied with, shall issue or authorize the issue of an International Sewage Pollution Prevention Certificate to the ship, and where appropriate, endorse or authorize the endorsement of that Certificate on the ship in accordance with this Annex.
- A copy of the Certificate and a copy of the survey report shall be transmitted as soon as possible to the Administration requesting the survey.
- A Certificate so issued shall contain a statement to the effect that it has been issued at the request of the Administration and it shall have the same force and receive the same recognition as the Certificate issued under regulation 5 of this Annex.
- No International Sewage Pollution Prevention Certificate shall be issued to a ship which is entitled to fly the flag of a State which is not a Party.

## **11.6 Form of Certificate**

The International Sewage Pollution Prevention Certificate shall be drawn up in the form corresponding to the model given in the appendix to this Annex and shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

## **11.7 Duration and validity of Certificate**

- An International Sewage Pollution Prevention Certificate shall be issued for a period specified by the Administration which shall not exceed five years.
- Notwithstanding the requirements of paragraph 1 of this regulation, when the renewal survey is completed within three months before the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding five years from the date of expiry of the existing Certificate.
  1. When the renewal survey is completed after the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding five years from the date of expiry of the existing Certificate.
  2. When the renewal survey is completed more than three months before the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding five years from the date of completion of the renewal survey.
- If a Certificate is issued for a period of less than five years, the Administration may extend the validity of the Certificate beyond the expiry date to the maximum period specified in paragraph 1 of this regulation.



- If a renewal survey has been completed and a new Certificate cannot be issued or placed on board the ship before the expiry date of the existing Certificate, the person or organization authorized by the Administration may endorse the existing Certificate and such a Certificate shall be accepted as valid for a further period which shall not exceed five months from the expiry date.
- If a ship at the time when a Certificate expires is not in a port in which it is to be surveyed, the Administration may extend the period of validity of the Certificate but this extension shall be granted only for the purpose of allowing the ship to complete its voyage to the port in which it is to be surveyed and then only in cases where it appears proper and reasonable to do so. No Certificate shall be extended for a period longer than three months, and a ship to which an extension is granted shall not, on its arrival in the port in which it is to be surveyed, be entitled by virtue of such extension to leave that port without having a new Certificate. When the renewal survey is completed, the new Certificate shall be valid to a date not exceeding five years from the date of expiry of the existing Certificate before the extension was granted.
- A Certificate issued to a ship engaged on short voyages which has not been extended under the foregoing provisions of this regulation may be extended by the Administration for a period of grace of up to one month from the date of expiry stated on it. When the renewal survey is completed, the new Certificate shall be valid to a date not exceeding five years from the date of expiry of the existing Certificate before the extension was granted.
- In special circumstances, as determined by the Administration, a new Certificate need not be dated from the date of expiry of the existing Certificate as required by paragraph 2.2, 5 or 6 of this regulation. In these special circumstances, the new Certificate shall be valid to a date not exceeding five years from the date of completion of the renewal survey.
- A Certificate issued under regulation 5 or 6 of this Annex shall cease to be valid in any of the following cases:

1. If the relevant surveys are not completed within the periods specified under regulation 4.1 of this Annex or
2. Upon transfer of the ship to the flag of another State. A new Certificate shall only be issued when the Government issuing the new Certificate is fully satisfied that the ship is in compliance with the requirements of regulations 4.7 and 4.8 of this Annex. In the case of a transfer between Parties, if requested within 3 months after the transfer has taken place, the Government of the Party whose flag the ship was formerly entitled to fly shall, as soon as possible, transmit to the Administration copies of the Certificate carried by the ship before the transfer and, if available, copies of the relevant survey reports.

### **11.8 Sewage systems**

Every ship which, in accordance with regulation 2, is required to comply with the provisions of this Annex shall be equipped with one of the following sewage systems:

- a sewage treatment plant which shall be of a type approved by the Administration, taking into account the standards and test methods developed by the Organization, or
- a sewage comminuting and disinfecting system approved by the Administration. Such system shall be fitted with facilities to the satisfaction of the Administration, for the temporary storage of sewage when the ship is less than 3 nautical miles from the nearest land, or
- a holding tank of the capacity to the satisfaction of the Administration for the retention of all sewage, having regard to the operation of the ship, the number of persons on board and other relevant factors. The holding tank shall be constructed to the satisfaction of the Administration and shall have a means to indicate visually the amount of its contents.

## 11.9 Standard discharge connections

To enable pipes of reception facilities to be connected with the ship's discharge pipeline, both lines shall be fitted with a standard discharge connection in accordance with the following table:

Standard dimensions of flanges for discharge connections

Description	Dimension
Outside diameter	210 mm
Inner diameter	According to pipe outside diameter
Bolt circle diameter	170 mm
Slots in flange	4 holes, 18 mm in diameter, equidistantly placed on a bolt circle of the above diameter, slotted to the flange periphery. The slot width to be 18 mm
Flange thickness	16 mm
Bolts and nuts: quantity and diameter	4, each of 16 mm in diameter and of suitable length
The flange is designed to accept pipes up to a maximum internal diameter of 100 mm and shall be of steel or other equivalent material having a flat face. This flange, together with a suitable gasket, shall be suitable for a service pressure of 600 kPa.	

## 11.10 Discharge sewage

The discharge of sewage into the sea is prohibited, except when:

- the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the nearest land or

- the ship is discharging sewage which is not comminuted and disinfected at a distance of more than 12 nm from the nearest land, provided that in any case, the sewage stored in holding tanks or sewage originating from spaces containing living animals, shall not be discharged instantaneously but at a moderate rate when ship is en route and proceeding at not less than 4 knots or
- the ship is discharging sewage using an approved sewage treatment plant.

### **11.11 Exceptions**

The discharge of sewage into the sea is allowed when:

- securing the safety of life or the ship or
- the discharge of sewage is as result from damage to a ship or its equipment if all reasonable precautions have been taken before and after the occurrence of the damage, for the purpose of preventing or minimizing the discharge

## CHAPTER 12: ANNEX V - Prevention of Pollution by Garbage from Ships

Garbage from ships can be just as deadly to marine life as oil or chemicals. The greatest danger comes from plastic, which can float for years. Fish and marine mammals can in some cases mistake plastics for food and they can also become trapped in plastic ropes, nets, bags and other items - even such innocuous items as the plastic rings used to hold cans of beer and drinks together.

It is clear that a good deal of the garbage washed up on beaches comes from people on shore - holiday-makers who leave their rubbish on the beach, fishermen who simply throw unwanted refuse over the side - or from towns and cities that dump rubbish into rivers or the sea. But in some areas most of the rubbish found comes from passing ships which find it convenient to throw rubbish overboard rather than dispose of it in ports. One estimate in the early 1980s suggested that more than six million cans and 400,000 bottles were being dumped into the sea from ships every day.

For a long while, many people believed that the oceans could absorb anything that was thrown into them, but this attitude has changed along with greater awareness of the environment. Many items can be degraded by the seas - but this process can take months or years, as the following table shows:

<b>Time taken for objects to dissolve at sea</b>	
Paper bus ticket	2-4 weeks
Cotton cloth	1-5 months
Rope	3-14 months
Woollen cloth	1 year
Painted wood	13 years
Tin can	100 years
Aluminium can	200-500 years
Plastic bottle	450 years

Source: Hellenic Marine Environment Protection Association (HELMPEPA)

The 1973 MARPOL Convention sought to eliminate and reduce the amount of garbage being dumped into the sea from ships. Under Annex V of the Convention, garbage includes all kinds of food, domestic and operational waste, excluding fresh fish, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically.

### **12.1 Disposal of garbage outside special areas**

- the disposal into the sea of all plastics, including but not limited to synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products which may contain toxic or heavy metal residues, is prohibited.
- the disposal into the sea of the following garbage shall be made as far as practicable from the nearest land but in any case is prohibited if the distance from the nearest land is less than:
  1. 25 nautical miles for dunnage, lining and packing materials which will float.
  2. 12 nautical miles for food wastes and all other garbage including paper products, rags, glass, metal, bottles, crockery and similar refuse.
- disposal into the sea less than 12 nautical miles may be permitted when it has passed through a comminuter or grinder and made as far as practicable from the nearest land but in any case is prohibited if the distance from the nearest land is less than 3 nautical miles. Such comminuted or ground garbage shall be capable of passing through a screen with openings no greater than 25 mm.

### **12.2 Disposal of garbage within special areas**

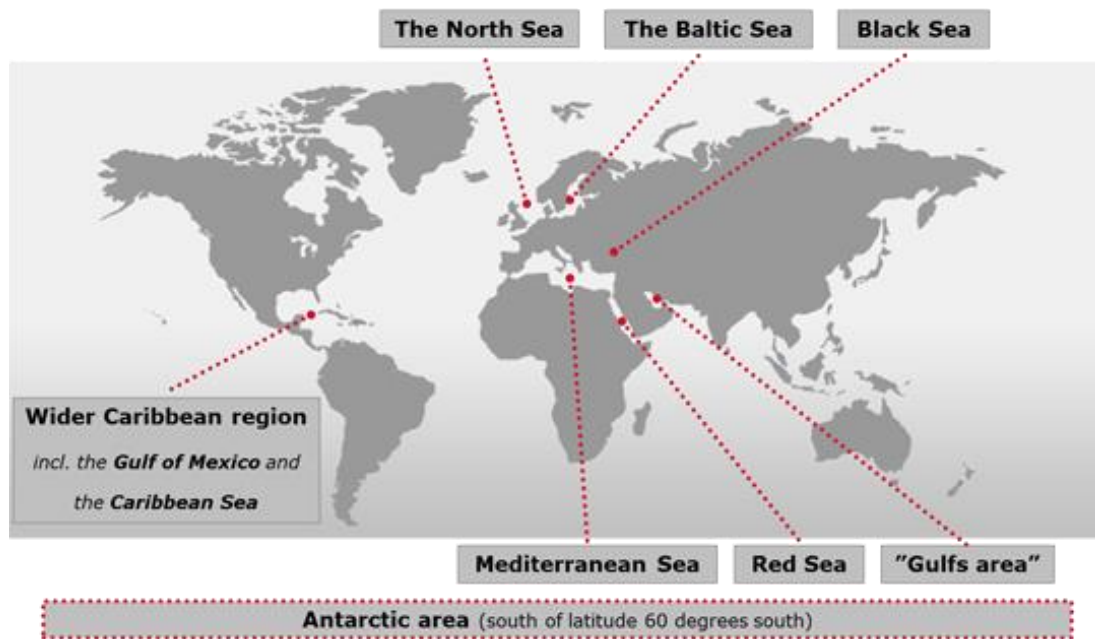
Annex V totally prohibits of the disposal of plastics anywhere into the sea, and severely restricts discharges of other garbage from ships into coastal waters and "Special Areas".

The special areas established under Annex V are:

- the Mediterranean Sea
- the Baltic Sea Area

- the Black Sea area
- the Red Sea Area
- the Gulfs area
- the North Sea
- the Wider Caribbean Region and
- Antarctic Area

## Marpol 73/78 Annex V - Special Areas



### 12.3 Exceptions

Regulations of this Annex shall not apply to:

- the disposal of garbage from a ship necessary for the purpose of securing the safety of a ship and those on board or saving life at sea
- the escape of garbage resulting from damage to a ship or its equipment provided all reasonable precautions have been taken before and after the occurrence of the damage, for the purpose of preventing or minimizing the escape
- the accidental loss of synthetic fishing nets, provided that all reasonable precautions have been taken to prevent such loss.

#### **12.4 Reception facilities**

- The Government of each Party to the Convention undertakes to ensure the provision of facilities at ports and terminals for the reception of garbage, without causing undue delay to ships, and according to the needs of the ships using them.
- The Government of each Party shall notify the Organization for transmission to the Parties concerned of all cases where the facilities provided under this regulation are alleged to be inadequate.

#### **12.5 Port State control on operational requirements**

- A ship when in a port of another Party is subject to inspection by officers duly authorized by such Party concerning operational requirements under this Annex, where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of pollution by garbage.
- In the circumstances given in paragraph (1) of this regulation, the Party shall take such steps as will ensure that the ship shall not sail until the situation has been brought to order in accordance with the requirements of this Annex.
- Procedures relating to the port State control prescribed in article 5 of the present Convention shall apply to this regulation.
- Nothing in this regulation shall be construed to limit the rights and obligations of a Party carrying out control over operational requirements specifically provided for in the present Convention.

#### **12.6 Placards, garbage management plans and garbage record-keeping**

- 1. Every ship of 12 m or more in length overall shall display placards which notify the crew and passengers of the disposal requirements of regulations 3 and 5 of this Annex, as applicable.
- 2. The placards shall be written in the working language of the ship's personnel and, for ships engaged in voyages to ports or offshore terminals



under the jurisdiction of other Parties to the Convention, shall also be in English, French or Spanish.

- Every ship of 400 gross tonnage and above, and every ship which is certified to carry 15 persons or more, shall carry a garbage management plan which the crew shall follow. This plan shall provide written procedures for collecting, storing, processing and disposing of garbage, including the use of the equipment on board. It shall also designate the person in charge of carrying out the plan. Such a plan shall be in accordance with the guidelines developed by the Organization and written in the working language of the crew.
- Every ship of 400 gross tonnage and above and every ship which is certified to carry 15 persons or more engaged in voyages to ports or offshore terminals under the jurisdiction of other Parties to the Convention and every fixed and floating platform engaged in exploration and exploitation of the sea-bed shall be provided with a Garbage Record Book. The Garbage Record Book, whether as a part of the ship's official log-book or otherwise, shall be in the form specified in the appendix to this Annex:
  1. each discharge operation, or completed incineration, shall be recorded in the Garbage Record Book and signed for on the date of the incineration or discharge by the officer in charge. Each completed page of the Garbage Record Book shall be signed by the master of the ship. The entries in the Garbage Record Book shall be at least in English, French or Spanish. Where the entries are also made in an official language of the State whose flag the ship is entitled to fly, these entries shall prevail in case of a dispute or discrepancy
  2. the entry for each incineration or discharge shall include date and time, position of the ship, description of the garbage and the estimated amount incinerated or discharged
  3. the Garbage Record Book shall be kept on board the ship and in such a place as to be available for inspection in a reasonable time. This document shall be preserved for a period of two years after the last entry is made on the record

4. in the event of discharge, escape or accidental loss referred to in regulation 6 of this Annex an entry shall be made in the Garbage Record Book of the circumstances of, and the reasons for, the loss.
- The Administration may waive the requirements for Garbage Record Books for:
    1. any ship engaged on voyages of 1 hour or less in duration which is certified to carry 15 persons or more or
    2. fixed or floating platforms while engaged in exploration and exploitation of the sea-bed.
  - The competent authority of the Government of a Party to the Convention may inspect the Garbage Record Book on board any ship to which this regulation applies while the ship is in its ports or offshore terminals and may make a copy of any entry in that book, and may require the master of the ship to certify that the copy is a true copy of such an entry. Any copy so made, which has been certified by the master of the ship as a true copy of an entry in the ship's Garbage Record Book, shall be admissible in any judicial proceedings as evidence of the facts stated in the entry. The inspection of a Garbage Record Book and the taking of a certified copy by the competent authority under this paragraph shall be performed as expeditiously as possible without causing the ship to be unduly delayed.

### **12.7 Form of Garbage Record Book**

Name of ship: \_\_\_\_\_

Distinctive number or letters: \_\_\_\_\_

IMO No.: \_\_\_\_\_

Period: \_\_\_\_\_ From: \_\_\_\_\_ To: \_\_\_\_\_

## **12.8 Introduction**

In accordance with regulation 9 of Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78), a record is to be kept of each discharge operation or completed incineration. This includes discharges at sea, to reception facilities, or to other ships.

## **12.9 Garbage and garbage management**

Garbage includes all kinds of food, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically except those substances which are defined or listed in other annexes to MARPOL 73/78 (such as oil, sewage or noxious liquid substances).

## **12.10 Description of the garbage**

Garbage is to be grouped into categories for the purposes of the Garbage Record Book (or ship's official log-book) as follows:

- A. Plastics
- B. Food wastes
- C. Domestic wastes (e.g., paper products, rags, glass, metal, bottles, crockery, etc.)
- D. Cooking oil
- E. Incinerator Ashes
- F. Operational wastes
- G. Cargo residues
- H. Animal Carcass(es)
- I. Fishing gear

## **12.11 Entries in the Garbage Record Book**

1. Entries in the Garbage Record Book shall be made on each of the following occasions:

1.1 When garbage is discharged to a reception facility ashore or to other ships:

- Date and time of discharge
- Port or facility, or name of ship
- Categories of garbage discharged
- Estimated amount discharged for each category in cubic metres
- Signature of officer in charge of the operation.

1.2 When garbage is incinerated:

- Date and time of start and stop of incineration
- Position of the ship (latitude and longitude) at the start and stop of incineration
- Categories of garbage incinerated
- Estimated amount incinerated in cubic metres
- Signature of the officer in charge of the operation.

1.3 When garbage is discharged into the sea:

- Date and time of discharge
- Position of the ship (latitude and longitude). Note: for cargo residue discharges, include discharge start and stop positions.
- Category of garbage discharged
- Estimated amount discharged for each category in cubic metres
- Signature of the officer in charge of the operation.

1.4 Accidental or other exceptional discharges or loss of garbage:

- Date and time of occurrence
- Port or position of the ship at time of occurrence (latitude, longitude and water depth if known)
- Categories of garbage discharged or lost
- Estimated amount for each category in cubic metres

- The reason for the discharge or loss and general remarks.

### **12.12 Receipts**

The master should obtain from the operator of port reception facilities, or from the master of the ship receiving the garbage, a receipt or certificate specifying the estimated amount of garbage transferred. The receipts or certificates must be kept on board the ship with the Garbage Record Book for two years.

### **12.13 Amount of garbage**

The amount of garbage on-board should be estimated in cubic metres, if possible separately by category. The Garbage Record Book contains many references to estimated amount of garbage. It is recognised that the accuracy of estimating amounts of garbage is left to interpretation. Volume estimated will differ before and after processing (e.g. shredding, compacting, incinerating, etc.).

### **12.14 Record of Garbage Discharges**

Ship's name: \_\_\_\_\_

Distinctive No., or letters: \_\_\_\_\_

IMO No.: \_\_\_\_\_

### **12.15 Garbage categories**

- A. Plastics
- B. Food wastes
- C. Domestic wastes (e.g., paper products, rags, glass, metal, bottles, crockery, etc.)
- D. Cooking oil
- E. Incinerator Ashes
- F. Operational wastes

G. Cargo residues

H. Animal Carcass(es)

I. Fishing gear

Date/time	Position of the ship	Estimated amount discharged into sea (m <sup>3</sup> )					Estimated amount discharged to reception facilities or to other ship (m <sup>3</sup> )		Estimated amount incinerated (m <sup>3</sup> )	Certification/ Signature
		Cat. 2	Cat. 3	Cat. 4	Cat. 5	Cat. 6	Cat. 1	Other		

## **CHAPTER 13: ANNEX VI - Prevention of Air Pollution from Ships**

### **13.1 Application**

Apply to all ships of 400 gross tons and above which have to carry an International Air Pollution Prevention Certificate (IAPP Certificate). This certificate must be on board at delivery for a ship constructed (keel laid) after 19 May 2005. For ships constructed before this date, the IAPP certificate must be on board at the first scheduled dry-docking after 19 May 2005, but not later than 19 May 2008. Ships of less than 400 tons still have to comply with the legislation where applicable, but in their case the Administration may establish appropriate measures in order to ensure that Annex VI is complied with.

### **13.2 General exceptions**

Regulations of this Annex shall not apply to:

- any emission necessary for the purpose of securing the safety of a ship or saving life at sea
- any emission resulting from damage to a ship or its equipment:
  1. provided that all reasonable precautions have been taken after the occurrence of the damage or discovery of the emission for the purpose of preventing or minimizing the emission and
  2. except if the owner or the master acted either with intent to cause damage, or recklessly and with knowledge that damage would probably result.

### **13.3 Ozone-depleting substances**

- Subject to the provisions of regulation 3, any deliberate emissions of ozone-depleting substances shall be prohibited. Deliberate emissions include emissions occurring in the course of maintaining, servicing, repairing or disposing of systems or equipment, except that deliberate emissions do not include minimal releases associated with the recapture or recycling of an

ozone-depleting substance. Emissions arising from leaks of an ozone-depleting substance, whether or not the leaks are deliberate, may be regulated by Parties to the Protocol of 1997.

- New installations which contain ozone-depleting substances shall be prohibited on all ships, except that new installations containing hydrochlorofluorocarbons (HCFCs) are permitted until 1 January 2020.
- The substances referred to in this regulation, and equipment containing such substances, shall be delivered to appropriate reception facilities when removed from ships.

### 13.4 Nitrogen Oxides (NO<sub>x</sub>)

Nitrogenous oxides (NO<sub>x</sub>) include NO, NO<sub>2</sub> and other oxides of nitrogen. The main NO<sub>x</sub>, Nitrogen dioxide (NO<sub>2</sub>) is a reddish brown, highly reactive gas that is formed in the ambient air through the oxidation of nitric oxide (NO). The major sources of man-made NO<sub>x</sub> emissions are high-temperature combustion processes.

The control of diesel engine NO<sub>x</sub> emissions is achieved through the survey and certification requirements leading to the issue of an Engine International Air Pollution Prevention (EIAPP) Certificate and the subsequent demonstration of in service compliance in accordance with the requirements of the mandatory, regulations 13.8 and 5.3.2 respectively, NO<sub>x</sub> Technical Code 2008 (resolution MEPC.177(58)).

Tier	Ship construction date on or after	Total weighted cycle emission limit (g/kWh) n = engine's rated speed (rpm)		
		n < 130	n = 130 - 1999	n ≥ 2000
I	1 January 2000	17.0	$45 \cdot n^{(-0.2)}$ e.g., 720 rpm – 12.1	9.8
II	1 January 2011	14.4	$44 \cdot n^{(-0.23)}$ e.g., 720 rpm – 9.7	7.7
III	1 January 2016*	3.4	$9 \cdot n^{(-0.2)}$ e.g., 720 rpm – 2.4	2.0



Tier I standards, defined in the 1997 version of Annex VI, apply to a diesel engine which is installed on a ship constructed on or after 1st January 2000 and prior to 1st January 2011, and represents the 17g/KW standard.

For Tier II, defined together with Tier III in the Annex VI amendments adopted in 2008, NOx emission levels for a diesel engine installed on a ship constructed on or after 1st January 2011 are reduced to 14.4 g/kWh. For Tier III, NOx emission levels for a diesel engine installed on a ship constructed on or after 1st January 2016 are reduced to 3.4 g/kWh when the ship is operating in a designated ECA. Outside a designated ECA, Tier II limits apply.

### **13.5 Sulphur oxides (SOx)**

SOx and particulate matter emission controls apply to all fuel oil, as defined in regulation 2.9, combustion equipment and devices onboard and therefore include both main and all auxiliary engines together with items such boilers and inert gas generators. These controls divide between those applicable inside Emission Control Areas (ECA) established to limit the emission of SOx and particulate matter and those applicable outside such areas and are primarily achieved by limiting the maximum sulphur content of the fuel oils as loaded, bunkered, and subsequently used onboard. These fuel oil sulphur limits (expressed in terms of % m/m – that is by mass) are subject to a series of step changes over the years, regulations 14.1 and 14.4:

<b>Outside an ECA established to limit SOx and particulate matter emissions</b>	<b>Inside an ECA established to limit SOx and particulate matter emissions</b>
4.50% m/m prior to 1 January 2012	1.50% m/m prior to 1 July 2010
3.50% m/m on and after 1 January 2012	1.00% m/m on and after 1 July 2010
0.50% m/m on and after 1 January	0.10% m/m on and after 1 January 2015

2020*	
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\* depending on the outcome of a review, to be concluded by 2018, as to the availability of the required fuel oil, this date could be deferred to 1 January 2025. MEPC 70 (October 2016) considered an assessment of fuel oil availability to inform the decision to be taken by the Parties to MARPOL Annex VI, and decided that the fuel oil standard (0.50% m/m) shall become effective on 1 January 2020 (resolution MEPC.280(70)).

The ECAs established are:

1. Baltic Sea area – as defined in Annex I of MARPOL (SO<sub>x</sub> only);
2. North Sea area – as defined in Annex V of MARPOL (SO<sub>x</sub> only);
3. North American area (entered into effect 1 August 2012) – as defined in Appendix VII of Annex VI of MARPOL (SO<sub>x</sub>, NO<sub>x</sub> and PM); and
4. United States Caribbean Sea area (entered into effect 1 January 2014) – as defined in Appendix VII of Annex VI of MARPOL (SO<sub>x</sub>, NO<sub>x</sub> and PM).

### **13.6 Volatile organic compounds (VOC)**

Volatile Organic Compounds or VOCs are organic chemicals that easily vaporize at room temperature. They are called organic because they contain carbon in their molecular structures. VOCs have no colour, smell, or taste. VOC is generated during combustion, and handling of oil products, whereas the latter is the most significant emission source related to shipping. The petroleum sector is the most important European source of emissions of VOCs due to loading of crude oil onto tankers generating large quantities of VOCs.

VOC from tankers are regulated in ports or terminals. The relevant Government designates which ports and terminals at which VOC emissions from tankers are to be regulated. A vapour emission control system approved by the governments shall be ensured. The vapour emission control system can be installed onboard the tankers. Terminals which have installed vapour emission control systems in accordance with

its regulation may accept existing tankers which are not fitted with vapour collection systems for a period of three years after terminal notification submission.

This regulation only applies to tankers. However, this regulation also applies to gas carriers only if the types of loading and containment system allow safe retention of non-methane VOCs on board or their safe return ashore.

### **13.7 Shipboard Incineration**

Each incinerator installed on board a ship on or after 1 January 2000 shall meet the requirements contained in appendix IV to this Annex. Each incinerator shall be approved by the Administration taking into account the standard specifications for shipboard incinerators refer to resolution MEPC 76(40) “Standard specification for shipboard incinerators”.

Regulation 16.6 generally requires that incinerators installed on ships constructed on or after 1 January 2000 or units which are installed on existing ships on or after that date are to Type Approved in accordance with resolution MEPC.76(40) - as modified by resolution MEPC.93(45) - Standard specification for shipboard incinerators. For these incinerators operating manuals are to be maintained onboard, regulation 16.7, and training as to their correct operation is to be given, regulation 16.8. Regulation 16.9 requires that operation is such that the stated temperatures are achieved in order to ensure complete incineration.

Shipboard incineration of the following substances shall be prohibited:

- Annex I, II and III cargo residues of the present convention and related contaminated packing materials;
- Polychlorinated biphenyls (PCBs);
- Garbage, as defined in Annex V of the present Convention, containing more than traces of heavy metals;
- Refined petroleum products containing halogen compounds;
- Sewage and sludge oil not generated on board;

- Exhaust gas cleaning system residues.

Regulation 16 permits incineration of:

- PVC - plastics (where type approved to do so) (Reg.16.3)
- Sewage sludge and sludge oil permitted in boilers but not when in ports, harbors and estuaries (Reg.16.)
- Incinerators installed before 24 May 2005 on domestic shipping can be excluded by the Administration (Reg. 16.6.2)
- Operating manual, training, and temperature control (Reg. 16.7 - 16.9)

### **13.8 Reception facilities**

The Government of each Party to the Protocol of 1997 undertakes to ensure without causing undue delay to ships the provision of facilities adequate to meet the:

- needs of ships using its repair ports for the reception of ozone depleting substances and equipment containing such substances when removed from ships
- needs of ships using its ports, terminals or repair ports for the reception of exhaust gas cleaning residues from an approved exhaust gas cleaning system when discharge into the marine environment of these residues is not permitted under regulation 14 of this Annex
- needs in ship breaking facilities for the reception of ozone depleting substances and equipment containing such substances when removed from ships.

Each Party to the Protocol of 1997 shall notify the Organization for transmission to the Members of the Organization of all cases where the facilities provided under this regulation are unavailable or alleged to be inadequate.

### **13.9 Fuel oil quality and availability**

In general this regulation is not directed to ships, rather to fuel oil suppliers and their control by the appropriate authorities together with other regulatory aspects. In particular the requirements of regulations 18.1, 18.2, 18.4, 18.5, 18.8.2, 18.9 and 18.10, together with aspects of regulations 18.8.1, should be seen as supportive of regulation 14 in respect of those aspects which are outside the control of the ship owner.

Regulations 18.6 and 18.8.1 have specific ship (for those that are required to have IAPP Certificates) related actions concerning the retention onboard of the bunker delivery notes for a period of not less than 3 years following delivery, subject to any relaxation afforded by application of regulation 18.11, and the retention, under the ship's control (therefore not necessarily onboard although they should be readily accessible if so required by the relevant authorities), of the representative fuel oil samples until the subject fuel oil is substantially consumed but for not less than 12 months from the date of delivery. These requirements apply irrespective of whether or not compliance with regulation 14 - SO<sub>x</sub> and particulate matter emission control - is complied with by means of bunkering fuel oils which do not exceed the stated limits.

The guidelines for the sampling of fuel oil for determination of compliance with MARPOL Annex VI have been updated to take into account the revised Annex VI, resolution MEPC.182(59). It is however necessary that oversight by the ship is applied both to the bunker delivery note and the representative fuel oil sample. In accordance with the revised guidelines for port State control under the revised MARPOL Annex VI, resolution MEPC.181(59), paragraphs 2.1.1.12 and 2.1.5 where the bunker delivery note does not contain the information as given in appendix V of revised Annex VI or the representative sample has not been drawn, labeled or sealed in accordance with the relevant guidelines that is to be duly documented and advised to the ship's flag State Administration with copies to the bunkering port authorities and the bunker supplier with a further copy retained onboard together with any relevant commercial documentation.

### **13.10 Information to be included in the bunker delivery note**

MARPOL Annex VI requires that the following information be included in the bunker delivery note provided to the receiving ship:

- Name and IMO number of receiving ship
- Port
- Date of commencement of delivery
- Name, address and telephone number of marine fuel oil supplier
- Product name(s)
- Quantity (metric tons)
- Density at 15°C (kg/m<sup>3</sup>)\*
- Sulphur content (% m/m)\*\*
- A declaration signed and certified by the fuel oil supplier's representative that the fuel oil supplied is in conformity with regulation 14(1) or (4)(a) and regulation 18(1) of this Annex.

## **Conclusions**

The adoption of the MARPOL Convention in 1973 was an important step in focusing the shipping industry's attention on the environment. It was no longer enough just to ensure goods and people were transported safely.

IMO is focusing on this through its Committees and Sub-Committees, and through its Technical Cooperation programme, which aims to assist developing countries in developing the infrastructure and trained personnel necessary to achieve ratification and implementation of the international regulations.

Besides MARPOL, IMO's safety related Conventions are also crucial elements in helping prevent accidents - and therefore helping prevent marine pollution.

However there is much more to be done in order to protect the marine environment and we hope to see more changes in the years to come.

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