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THE MARITIME SEARCH AND RESCUE CONVENTION, 1979

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GENERAL CONSIDERATIONS

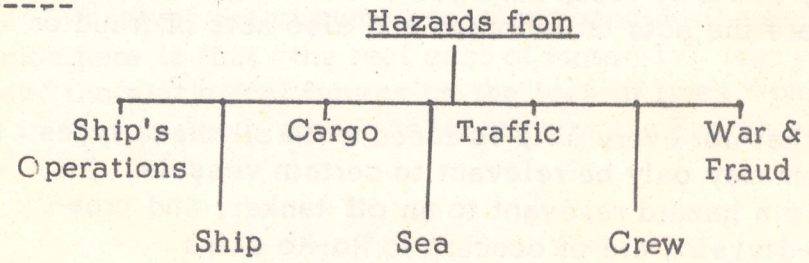
Introduction

Hazards at sea have always been more significant than those on land. The sea voyage was regarded as a great adventure exposed to various perils and piratical acts. Therefore, saving life at sea and organising search operations were of a paramount importance. Pirates were described as hostis humanis generis; the enemy of the human race.

Over the years, many improvements have been achieved in the search services and in the equipment to be carried on board the ship. Pirates were punished in many countries and the Geneva Convention, 1958, on the High Seas requires in Article 14, that: "All States shall co-operate to the fullest possible extent in the repression of piracy on the high seas or in any other place outside the jurisdiction of any State".

It is true that in recent years, advanced ship design and the new technology would reduce the risks to the crew and has made their task safer. Also the various Codes of Practice adopted by the industry would ensure a higher standard of safety in operationg the ships. Nevertheless, hazards at sea are still with us. In fact, some of the hazards were not known in the past and it would be useful to give a few details on the present hazards.

Hazards



Ship's Operations. Hazards resulting from ship's operations are considered to be the most serious ones throughout the history of Navigation. There are many studies on relevant factors to casualties involved. These factors should be divided into the following groups:(a) human errors;(b) environmental conditions; (c) technical deficiencies; and (d) nature of casualties.

Ship Hazards. These hazards could be caused by defects in the buoyancy, stability, free board, strength of hull, equipment on board sub-standard ships.

Cargo Hazard. Certain cargoes, because of their nature, are inflammable, explosive or radioactive. Furthermore, the methods used for handling the cargo may be dangerous because of defects in the packing or the preparation of loading and discharging the cargo.

Sea Hazards. These can be caused by tropical storms, strong current, bad visibility, ice, fog, land rock, etc. In addition, there are the underwater hazards caused by the movement of submarines, the existence of cables, pipelines and various commercial and scientific activities.

Traffic Hazards. Traffic in crowded channels and waterways and the existence of offshore installations in certain areas, such as the Gulf of Mexico, present a real hazard to vessels navigationg in these areas.

Crew Hazards. Safety depends largely on the skill of the crew and therefore training programmes and courses for seamen are important. However, deaths from normal accidents, such as falling down the hatchways, are high and it seems that the rate of occupational death for merchant seament is higher than for most shore workers.

War, Sabotage and Maritime Fraud. When acts of war, hostilities and tensions occur in some areas, this would represent a real hazard to ships operationg in them. They could be lost, damaged or detained. In addition to the war hazards there are the acts of sabotage and also acts of fraud or piracy.

It must be noted that not every ship is faced with all these types of hazards as some of them may only be relevant to certain vessels. For instance, oil pollution is a hazard relevant to an oil tanker, and problems of stability and sub-division are of concern to Ro-Ro ships.

IMCO Works .

IMCO, the specialised agency of the United Nations has approved twenty conventions and adopted 461 Resolutions which cover almost every sphere of maritime activities. The international regime established by IMCC aims at promoting safety at sea and the prevention of marine pullution. Certainly hte international measures taken in this respect made a valuable contribution to safety at sea. However, despite these efforts, the standards for the design, construction alteration, repair, maintenance and manning of many ships are not stringent and comprehensive. Furthermore, the inspection and enforcement of the international rules are usually left to the flag State. As a result of the non-adherence to the international standards and the lack of an effective inspection, traffic in certain areas creates hazards to life, property and the environment. As these matters

are of national concern, it would be important to have an idea of the number of lives lost at sea.

STATISTICS ON LOSS OF LIFE

Despite the international measures outlined in the previous section, accidents with loss of life are not infrequent. Therefore additional measures aimed at saving life were introduced and the crews are trained to face these critical situations. In fact the increase in the number of ships highlights the importance of the present issue and its social and economic implications. It is well known that safety measures and the necessary equipment required on board ship would increase the running costs of the ship. Hence it is very difficult to draw the line between the desirable safety requirement and the viability of the project in financial terms.

It is true that usually international measures are adopted as a result of major accidents from reports of Courts of Inquiry. However it is not always easy to determine whether similar accidents would occur in the future as improved additional measures are required. For example, in the case of a missing ship the causes will be unknown and views formed in this respect are based on guess work.

Whatever the circumstances surrounding the accidents are, the importance here is that "the real cost of human life lost cannot be ignored." Perhaps the statistical figures on the loss of lives would be a useful element in formulating a proper conception of the Search and Rescue Convention.

Statistics in the United Kingdom.

The development of statistics on loss of lives and injured seamen in the United Kingdom was carried out by some tanker companies, mainly to assess the social costs associated with their operations. For this purpose a Shipping Tankers Safety Group was formed to collect the statistics.

On the other hand, for some years the General Council of British Shipping has adopted an arrangement for the 'voluntary reporting' of accidents ashore, assaults, self-inflicted injuries and loss of lives. The figures received are published in the GCBS' confidential 'Annual Reports' and are not available to non-members.

However Section 73 of the Merchant Shipping Act 1970, states:

1. "Where any such casualty as is mentioned in Section 55 (1) of this Act has occurred in the case of a ship or ship's boat and at the time it occurred, the ship was registered in the United Kingdom, the owner or master of the ship shall, as soon as practicable, and in any case not later than twenty four hours after the ship's arrival at the next port, report the casualty to the Board of Trade, giving a brief description of it and stating the time and place where it occurred, the name and official number of the ship, its position at the time of the the report and the next port of call.

2.- If the owner or master of a ship fails without reasonable cause, to comply with the preceding provisions of this Section he shall be liable on summary conviction to a fine not exceeding £ 100.

It is interesting to note that in the Ocean Fleets Safety Bulletin, N° 20 of December 1980, the following conclusions are made:

Accident per vessel type		Average
Container	21	4.2
Cargo/Car/RoRo	94	3.7
Bulker/Obo	29	3.6
Tanker/Obo	9	1.8
Overall average per vessel		3.5

The H.M. Coastguard used to publish statistics until 1978 and the Cardiff Seamen's Register Statistics were no longer compiled after 1972. Since 1976 the Department of Trade (DoT) became in charge of the relevant statistics through its publication "Casualties to Vessels and Accidents to Men". In view of the importance of the figures and their relevance to the present research, the table relating to death among crews from all causes between 1963 and 1977 is reproduced in Figure .

It must be noted that statistics alone, as mentioned in the 1979 Report of the Sealife Programme, would not give a true picture of the dangers faced by seamen. The National Union of Seamen believes that:

(a) there are some hidden casualty figures;
(b) the reporting should be made compulsory;
(c) an independent authority should be given the right to control the system of reporting;

(d) deaths of seamen ashore which originated at sea should be included in the statistics.

International Statistic Figures

Since 1890 Lloyd's Register of Shipping has published its casualties' return. These indicate that the incidence of total losses over the last few years has increased to an extent which warrants a closer look and a detailed investigation. A statistical summary for 1979 shows that a total of 2.21 million frt was nearly half a million grt above the previous year's losses. It does not give information on loss of life.

However the figures published by the UK Tanker Safety Group show that between 1968 and 1979, 1,523 officers and ratings serving on board tankers, combined carriers and gas carriers of over 10,000 dwt lost their lives. IMCO and Lloyd's Register of Shipping examining these figures admitted they are inaccurate because they are based on information compiled from only those casualties which were reported.

An important development in this field is the decision taken by the Maritime Safety Committee of IMCO, at its 39th session in 1979, to set up a Steering Group on Casualty Statistics. The Group will establish an effective scheme for the recording and analysis of casualty data. This kind of information, it is hoped, will prove that the risk to life at sea is far beyond Governments' estimation. It could also encourage many Governments' to ratify and comply with the various international conventions.

Whatever value could be attributed to the statistics, the central fact remains that certain action must be taken as soon as such emergencies occur. For this purpose the Convention on Maritime Search and Rescue 1979 was adopted.

THE ROLE OF COMMUNICATIONS IN SEARCH AND RESCUE

"Seafaring is an adventurous calling. Seafarers are always in conflict with nature and have made epic voyages in danger of ship-wreck from earliest times". Ships in distress detected by other passing ships at short distance, some 5 miles or less by visual means, or if the ship in distress was near the shore, the help which could be provided depends upon the nearest available source of aid which exists.

Until 1900 visual lookout was the only means of communication for vessels in distress. At about this time an enormous improvement was made by Marconi's invention, whose introduction to shipping came from "the adoption of wireless telegraphy by the Admiralty". By this means the message from a ship in distress could be received by more distant ships which could still give the assistance required in a timely manner.

Radio-Communication

The technical development of the radio system during this century has produced many remarkable improvements and MF, HF and VHF have been sufficient for communication needs at sea. However, as more nations enter into the shipping world adding to the existing development, the increased number of ships involved could result in a shortage of radio-channels.

Radio is used not only for safety reasons, but also for the transmission of operational instructions and personal messages, so clearly serious delays are unavoidable. There is heavy congestion on a large range of frequencies which tend to get saturated by the sheer volume of traffic. Since there are similar problems with the frequency bands used by aeronautical and broadcasting services, it is not likely that additional space can be allocated to Search and Rescue co-ordination for use by a mobile maritime service.

The body responsible for such allocation is the International Telecommunication Union (ITU), which is an Inter-Governmental Organisation with 135 member countries. Its activities are governed by the Montreaux International Telecommunication Convention, 1965 and the latest edition of the comprehensive radio regulations was published in 1968.

Satellite Assistance

In recent years, poor quality in transmission and areas of black-out in the communications are increased principally by traffic congestion, bad weather and under certain ionospheric conditions. Nevertheless, it could be eliminated by the new space technology.

In fact, the main attractions of communications via satellite are to:

(a) relieve the pressure on the MF and HF bands;
(b) improve the quality of transmission;
(c) improve the geographical coverage; and

(d) improve distress communications.

For these reasons, the World Administrative Radio Conference for Space Telecommunications was held in June 1971, under the auspices of ITU. Although the Conference had the opportunity to specify the operational requirements for a maritime satellite system, it unfortunately did not take these requirements into account when deciding on the frequencies to be allocated and on other technical matters.

Notwithstanding, the Conference considered certain recommendations prepared by IMCO which state that space communication techniques could be used in exchange of information, in particular for alerting and locating ships in cases of distress and emergency.

Marisat Programme

The Maritime Satellite System (Marisat), developed by Comsat General Corporation of the United States, represents one of the most significant advances in maritime communications since the advent of wireless telegraphy at the turn of the century.

Marisat uses three satellites stationed over the Atlantic, Pacific and Indian Oceans, and they operate at different frequencies to serve distinctly different needs: UHF for Navy Service, L-band and C-band for commercial maritime users.

The shore stations are: at Southbury, Connecticut, for operation with the Atlantic Satellite; at Santa Paula, California, for operation with the Pacific Satellite; and a third shore station is in Yamaguchi, Japan, operating via the Indian Ocean. A general Control Centre in Washington, D.C. serves as the nerve centre for command and control of the three satellites in orbit.

The capacity for data communication is 1,200 and 2,400 bits per second. This service includes: a high quality two-way telephone link, interconnected with the world-wide telephone network; a telex system interconnected with the world-wide 50-band teleprinter network; and facsimile system having many uses such as manifests, drawings, daily reports, weather maps and other graphic materials. All of this information can be exchanged from ship-to-shore and vice versa.

Distress messages from vessels on the US Maritime Satcom System are rounted directly to US Coast Guard co-ordination centres for appropriate action as part of the AMVER System.

Marisat was planned to provide comprehensive coverage over the world's three major ocean areas between 70 degrees North and 70 degrees South, and the marine electronic industry has been developing associated equipment for use on board ships and ashore.

Despite the advantages of Marisat, certain shortcomings have resulted in many international objections based principally on the fact that it is not an international or global system and because of its obvious political dependence on one nation. However, it will now be considered how it might be possible to obtain a solution to this problem.

Marecs Satellites

The European Space Agency (ESA) was formed by 10 countries: Belgium, Denmark, France, Germany, Holland, Italy, Spain, Sweden, Switzerland and the United Kingdom. The major financial contributors among them have assumed overall responsibility for a particular aspect of ESA's effort: France is to inagurate the spatial service when the 'Ariane' vehicle is launched; Germany is the leader on the spacelab orbiting laboratory; and Britain is to team up with companies throughout Europe and act as guarantor for their technical ability.

The ESA programme consists of five European Communication Satellites (ECS). The first will be the 'Ariane' vehicle in orbit from May 1981, the second will be in orbit six months later and the others will be launched before 1990. ECS are designed to carry 12,500 telephone circuits and two television channels, and the satellites will relay the whole of European Broadcasting Union's Eurovision.

ECS will be preceded into orbit by Marecs (Maritime European Communication Satellite), a derivative of the ESA programme carrying a different payload but using many common components. The first Marecs will be launched aboard the 'Ariane' vehicle and it is hoped that four Marecs will form part of a worldwide marine network which will be discussed in the following paragraph.

Marecs will give a greater coverage, allows radio telephone and teleprinter transmissions to be automated and provides a link for a meteorological and hydrological bulletin. At the same time, Marecs will be capable of providing services such as data transmission which are not possible on the MF and HF bands, as well as an improved safety and distress service.

In practice the Marecs will have Coastguard connections with all the maritime countries, and distress messages will be initiated (via telex or telephone) by depressing a distress button when the system is in operation. This button will immediately have access to terminals, with overriding priority assigned to the ships relaying the message to a rescue co-ordination centre.

In Britain the terminal will be at Falmouth MRSC, with the necessary line connections to the Post Office Satellite ground station at Goonhilly. The telex and telephone terminals are currently being planned.

INMARSAT Organisation

In March 1972 the IMCO Maritime Safety Committee decided to establish a panel of experts to study the above-mentioned problems in detail. The panel held six meetings and prepared a report which included the following sections: reasons for establishing a maritime satellite system; operational requirements; basic technical parameters of a first-phase system; channel assignment and terrestrial interface; economic assessment; and organisational and institutional arrangements.

The report was submitted to a conference convened by IMCO. It held three sessions, the first in April 1975, the second in February 1976 and the third in September 1976. It adopted two instruments: the Convention on the International Maritime Satellite Organisation (INMARSAT) and the Operating Agreement on the International Maritime Satellite Organisation.

On July 16, 1979, the INMARSAT Convention came into force and it was accomplished with a reconciliation of political and economic interests of diverse and even opposing character in an operational agency. It is interesting to note that INMARSAT is a combination of an inter-governmental organisation enjoying privileges and immunities and commercial enterprise formed by public and private "shareholders". This means that the Organisation enjoys both the political authority and commercial flexibility.

The satellite system involved in INMARSAT has three main components as follows:

(a) Space segments will consist in principle of 3 Marisat and 3 Marecs, with 2 satellites placed in geostationary orbit over each of the three oceans. It is possible, at some future date, that 48 satellites could be providing a global distress system.

(b) Shore stations performing the inter-connection between the network ashore and the satellite system by either partial or fully automatic means.

(c) Ships terminals carrying out the subscriber services of the system with tuning and other functions controlled by the shore stations to which they are connected.

This system will, of course, have to possess global capacity and basically the aim of this organisation is to make proper provision for the space segment necessary for improving communications at sea including those in connection with human life saving, management efficiency and other aspects.

There is no discrimination on grounds of nationality and it is likely that workers in danger on ODAS, such as platform oil rigs at sea, could be rescued by means of this communications system. In this form INMARSAT has changed the telecommunication scence with most unusual possibilities where multinational accord is concerned.

Althouth INMARSAT was born from IMCO's effort, the new organisation does not deem itself to be part of the UN family of organisations. It will certainly have to have an effective 'modus vivendi' with several other organisations. In fact, there are those mentioned already (IMCO, ITU), but in addition there are others of potential importance such as the UN Conference on Trade and Development (UNCTAD), which is active in the field of shipping; the International Labour Organisation (ILO), which deals with the welfare and safety of seafarers; and even the World Bank, which loans money to governments for projects of potential commercial benefits..

The INMARSAT internal structure consists of three elements: the Assembly of States which sign the convention and have one vote each the Council, where States are represented according to their investment in shares and have 'weighted voting' as in the International Monetary Fund (IMF); and finally the Directorate or Staff based in London.

The use of satcoms (satellite communications) for distress traffic has its problems and complexities. For example, the cost of 48 special low orbit satellites could be considerable but a solution must be found; and it is necessary, if it is technically possible, for survival craft to carry a distress alerting system.

Finally, the operator on the ship in distress will enter in the equipment, the ship's position and time and nature of distress, if time permits and these are not automatically provided. He will then activate the distress call. The control of distress traffic will be the responsibility of the ship in distress when it has communicated with assisting SAR units using the short and medium range communication facility. The control of distress traffic for long range purposes will be the responsibility of the appropriate rescue co-ordination centre. In both cases, the control of distress traffic may be delegated.

The considerations above indicate that the future Global Maritime Distress and Safety System will be a feasible reality in the near future, using the existing satellites until such time as world coverage is achieved.

CO-ORDINATION OF SAR SERVICES

Despite the national effort applied to coast watching and search and rescue services, sometimes a marked lack of control and co-ordination, by individual countries in pursuit of their own requirements and resources, has been observed around the world. As a result national organisational plans have developed along different lines.

The dissimilarity of such plans and the lack of agreement and standardised procedures on a world-wide basis, gives rise to certain difficulties although these are generally limited to the initial stages of an alert. In some cases, they can also result in an uneconomical use of SAR facilities, or in unnecessary duplication of effort. Furthermore, differences in procedures and lack of lines of communication may result from the fact that personnel and equipment used for SAR are sometimes part of the military services of the country concerned, and their use has certain restrictions unless a solution should be found under common purposes.

In certain regional areas, neighbouring countries have established regional arrangements which operate successfully and have agreed lines of communication, standard procedure and areas of responsibility for co-ordination and control of the distress at sea. The exchange of personnel, frequent contacts between the authorities involved, technical conferences or symposia and technical publications, have helped to resolve operational difficulties and contribute to the system's effectiveness. Obviously, SAR operations could be extended and its practices or exercises agreed upon on a world-wide basis by means of the 1979 Convention.

However, the purpose of this Section is to illustrate the pre-

plan, taking into account the requirements of the future system.

A 1990 implementation date for the future system was planned by INMARSAT and IMCO. However, it was recognized that a great number of administrative, technical and installation problems may arise which may effect the final date of implementation.

In view of the dependence of the future system on the provision of world-wide search and rescue co-ordination, this preferred implementation date for the system might not be achieved unless a co-ordination of SAR services in all areas is provided.

An important aspect of the future system is the provision of Short/Medium range (up to 100 miles) distress call and communication facilities which will provide SAR co-ordination and assistance in the immediate area of the distress. The other aspect is the provision of long range distress call and communication facilities which could provide for co-ordination by a remote station many thousand of miles from the area of distress if SAR co-ordination facilities were not locally available.

The present system is primarily based on aural watch being kept by ships and shore stations for distress calls and messages. Distress traffic is conducted by morse telegraphy or by radiotelephony. The normal range of communication is not required by Chapter IV of the 1974 SOLAS Convention to exceed 150 miles; it is therefore essentially a Short/Medium range system.

The future system will use automatic alerting (digital selective calling) by means of terrestrial and satellite communication facilities. Distress traffic will be conduced by voice or by radio teleprinter (narrow band direct printing). The future system will, in addition to short/medium range alerting, also provide for long range alerting and communications.

The future system will be global and designed to ensure that:

(a) alerting, identification and positioning are quickly and reliably performed in all types of distress incidents;

(b) a telecommunications network exists to facilitate the rescue of survivors including their location and the co-ordination of fescue units;

(c) it is reliable and that equipment to be used by persons in distress will be simple to operate; and

(d) it is able to accomodate co-incident distress calls.

Distress alerting means the successful reporting of a distress situation to a until which can provide or co-ordinate assistance. The distress call which provides the alerting will be sent automatically and will provide for self-identification, particulars of the ship's position and time and nature of distress. Alerting may be achieved using the following methods: Ship-to-shore alerting; shore-to-ship alerting; or ship-to-ship alerting.

Short/medium range systems should always be used to alert ships except at long range and when within range of the shore. In this sense the future system includes associated coast stations and coast/earth stations belonging, for example, to H.M. Coastguard or COBREM, which is defined as a unit responsible for promoting efficient organisation of SAR services and for co-ordinating the conduct of Search and Rescue.

In addition, the future system will provide for long range distress alerting using terrestrial radiocommunications (HF) but will primarily be based on satellite techniques including satellite EPIRBs and other similar alerting devices. Such low-powered distress transmitters would also be used in certain instances when near to shore.

In "IMCO Notes", Seaways, November 1980, it was reported that "experience already gained shows that satellite communications are more efficient than existing methods; they also offer such advantages as rapid access, high reliability and long range", also the probability of receiving a distress alert is significantly enhanced by a comprehensive system of mutually co-ordinated receiving stations. A similar network of transmitting stations will also improve the probability of alerting ships.

When the distress call is transmitted by the ship in distress using satellite links, on receipt of the distress call by the appropriate rescue co-ordination centre, this centre will initiate a distress call to be relayed to mobile units in the vicinity of the ship in distress, using the appropriate short, medium or long range facilities provided for the future system.

On receipt by a ship of a relayed distress call the ship will establish communication with the appropriate SAR centre. The ship will also attempt to establish communication with the ship in distress. To enable distress calls received at one rescue co-ordination centre to be rapidly transmitted to the rescue co-ordination centre responsible for the area in which the distress has occurred, there is a requirement that the rescue co-ordination centre should be permitted to use a maritime satellite link.

However, since the total INMARSAT elements are not yet implemented, other devices can assist in the interim, for example, the emergency Position Indication Radio Beacon (EPIRB System) which is being developed to indicate position when the ship is interrogated by a satellite. Automatically a bearing on the ship in distress is obtained in an attempt to co-ordinate the rescue of survivors.

The provisional draft system above is intended by IMCO to be linked closely to the services provided by INMARSAT. The system will provide for the integrated use of all frequency bands to ensure the reception of distress and safety messages at short, medium and long ranges. The wide use of satellites for reporting and locating purposes as SAR operations will be a distinctive feature of the future system.

Other important work is in relation to the changes needed to the existing Radio Regulations to be made for the next World Administrative Radio Conference for the Mobile Services which is expected to be held in 1982. The necessary changes to the 1974 Safety at Sea Convention with provisions for the transitional plans are expected by IMCO to be ready by June 1981.

The suggestions above are being considered by the authorities concerned and it is planned that the entire programme will be operating in 1990. It is hoped thereafter that the messages of any ship in distress will be received in fact into a "Global Maritime Distress and Safety System" in order to co-ordinate appropriate Search and Rescue Operations.

The Future Global Maritime Distress and Safety System

The IMCO Sub-Committee on Radiocommunications has developed the requirements of the future Global Maritime Distress and Safety System. The objective of the system is, as was examined above, to provide for adequate radiocommunications in order to promote safety of life at sea. The system will support the International Convention on Maritime Search and Rescue 1979, and ensure the rapid transfer of distress messages from those in distress to the units best suited for giving or co-ordinating assistance.

The Sub-Committee on Radiocommunications recognized that the future system is very dependent upon an efficient and well-developed international SAR organisation with functioning rescue co-ordination centres responsible for SAR operations and would like the Sub-Committee on Safety of Navigation to prepare, as a matter of urgency, a maritime SAR

convention positon and this will be done by means of specific examples concerned.

MAIN FEATURES OF THE CONVENTION

The brief expose of the provisions of the Convention, the Annex and the Resolutions, would assist in formulating certain comments. They could be summarised in the following points:

1. The Convention represents an important link between Air SAR Organisation and Maritime SAR Operations. The traditional and existing Regulations in this field were carefully taken into account.

2. Maritime SAR Organisation is perhaps a more general expression and refers to procedures for Safety at Sea, irrespective of the class of ship, nationality, or the maritime area involved. In other words, the Convention, belongs to the shipping community throughout the world.

3. The present climate is suitable for the entry into force of the Convention since the INMARSAT Organisation would be instrumental for an effective Search and Rescue Operation. Further air co-ordination based ashore has gained experience in sea services. This was made possible in principle by the use of the AMVER System operated By the U.S. Coast Guard. Therefore, maritime SAR organisation could usefully combine the forces of these important efforts.

4. It is important for a successful SAR service to set up an organisation to co-ordinate the efforts. Such an organisation could be civil or military but without effecting a mutual co-operation between Member States of the Organisation.

5. The requirement of the ratification of fifteen States to bring the Convention into force, indicates the willingness of the international community of adopting its standard precedures as soon as possible.

6. The SAR Organisation can co-exist with other services without interfering with them. For instance, the patrolling by aircraft and ships in some fishing zones and the surveillance against marine pollution, would be considered.

It is possible that in zones of heavy traffic the patrols could be of particular help in co-ordinating SAR operations without undue delay by means of these units in the same area.

7. The Convention is not only protecting the lives of the crew, passengers and others on board the ship, as its effects go beyond seafarers and shipowners and are directly of public concern.

8. The International Conference on Maritime Search and Rescue, 1979. attended by delegates from fifty three States, with a total of two hundred and forty five participants, clearly recognized the importance and necessity for co-operation in this matter. It is remarkable that the Final Act was unanimously approved by the delegates. Many Governments, however, may still not be able to implement the Convention because of technical and financial reasons.

Obstacles in the implementation of the Convention

In addition to the difficulties in developing a future Global Maritime Distress and Safety System, there are other obstacles. The most important are: the lack of resources, both financial and technical, possessed by some developing countries; the lack of a real of IMCO; the non-standardisation of lifesaving appliances; the need for extending the services to offshore installations; the deficiencies in the private law of salvage and the rules on deviation in Marine Insurance. Therefore, it is necessary to say a few words on these obstacles and the suggested remedies.

The Developing Countries

The past decade can easily be regarded as an era of the beginning of shipping development from non-traditional maritime countries. However, despite the ambitious programmes and the aspiration of many developing countries for their own merchant fleet, they are generating over sixty per cent of all the cargoes exported, but possess merely nine per cento of the shipping tonnage.

The main problem is that shipping is a highly capital-intensive and the majority of the developing nations are unable to supply the capital needed. Furthermore, shipping does not offer, like some other industries, a solution to their problems of high unemployment.

Thus, the obstacles for some developing countries are related to the financial resources needed for SAR services and also to the lack of experience in this field. One can argue that industrialised countries should assist the developing nations to gain experience.

However, the major incidents of SAR and the measures taken are

on record which are easily accessible to any country.

Many developing countries believe that IMCO should assist them in setting up regional centres for SAR and provide a programme for technical assistance in this respect, or to encourage closed co-operation between regional units. This would be much better than having a number of inefficient national units.

In fact, what the developing countries are asking for is one of the IMCO purposes. However, the implementation of Search and Rescue Organisation would largely depend upon the individual Member State.

The Need for Standardisation of the Life-saving Appliances

In order to achieve an efficient SAR service, IMCO should attempt to standardize the life-saving appliances. Thus, the equipment required for SAR operations and units such as lifeboats, airplanes and helicopters should be assigned in the light of experiences in each sector, e.g. the usual conditions of weather, distances from SAR stations, etc. Also, the SAR operations should be under review and amendments to MERSAR and IMCOSAR Manuals should be made when it is necessary. Finally, there is a need for recommending programmes for a common SAR organisation.

In fact, the International Life-boat Conference Organisation, a non-Government body, is working on these lines. At its XIII th Conference, organized by the North and South Dutch Lifeboat Institutions, the Board of Navigation and Maritime Affairs, which administers the Lifeboat service in the German Democratic Republic, presented a diagram and explanatory notes on the different inflatable life-raft models. This was the result of studies carried out by the Nautical Engineering College, Warnemund/Wustrow, and the suggested design differs substantially from those recommended in the MERSAR and IMCOSAR Manuals.

Offshore Installations

At the end of 1977, there were 439 mobile drill units in existence, of which 306 units were registered in seven countries. The drilling units were working in about 26 geographical areas. The most important ones were in the Gulf of Mexico , in the North Sea and in the Persian Gulf. Units in operation were jack-up rigs, semi-submersibles, submersibles and ship shape vessels.

Some of these rigs are considered to be vessels under the Merchant Shipping Act while others are regarded as fixed platforms. Both types are exposed to the same hazards. Thus, while the above distinction is valid for the purpose of registration and others, they are unacceptable for the SAR services.

Recently IMCO approved the Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU CODE). This Code has been developed to provide an international standard for mobile offshore drilling units of new construction, so that its application a will facilitate the movement and operation of these units. Thus, it would result in a level of safety for such units and for personnel on board equivalent to that required for conventional ships subject to the 1974 SOLAS and the 1966 Load Lines Conventions and which are engaged in international voyages.

The MODU Code does not refer to the drilling operations which are subject to the control of the coastal State. However, the requirements of the Code would assist the various authorities in each country to work together. Although the Code does not mention SAR services, it allows them for the following reasons:

(a) many accidents occurred on drilling vessels or platforms with losses of lives of many people involved. These are irrevocable proff that safety measures must be added by means of opportune SAR assistance;

(b) accidents on offshore installations may result in a great number of lives lost because of the concentration of people in a complex and narrow working place. Evacuation from shore. This also means the need for specialised SAR assistance;

(c) an accident on oil or gas rigs causes extensive pollution, explosion or fire, with extraordinay danger to the workers;

(d) experiences are developed on pipelying communications with the co-operation of SAR organisation; and

(e) by means of visual watchkeeping or radar plotting from offshore installations, it should be possible to help the SAR operations when ships are in distress in its vicinity.

Another problem in relation with the offshore safety is the

managerial structure and its development. For example, in the United Kingdom, the Burgoyne Committee on offshore safety recommended, in March 1980, that a single government agency should be responsible for setting up offshore safety standards and rules for their enforcement. At present the Department of Energy has responsibility for all aspects of offshore safety, except for the safety of ships and seafarers engaged in offshore works which remain under the responsibility of the Department of Trade.

Considering the aspects above, the offshore installations may be added to the International Convention on Maritime Search and Rescue, 1979. It should be possible under Resolution 6, on "Development of a Global Maritime Distress and Safety System" which invites IMCO to develop this system and includes telecommunications provisions. With such an extension to these maritime installations, protection would be afforded to workers in danger, through the SAR organisation.

Experiences at SAR Operations

The SAR service depends on the special circumstances of each incident and therefore it is difficult to provide for a rigid pre-planned shceme to be followed in future SAR operations. However, it is important that past experience, especially of unusual circumstances, influences future procedures and schemes. In this respect, the experience of the "On Scene Commander" would be important for the programme of training. For example, during a routine voyage from Bahrain to Sharjah, in 1980, the tanker Minab was involved in the rescue of seven stranded Iranian seamen. They were all from the fishing village of Boroozjun in Southern Iran and had been drifting for three days across the Gulf of Oman following the engine failure of their old fishing boat, which was in imminent danger of sinking. The Minab was the first vessel to see the distress signals.

The Minab's master took all the necessary measures and after 24 hours the survivors were handed over to the Sharjah Police. The Immigration Authority assured the master that the men would be well cared for and repatriated them in due course.

The action above could be described as a "normal" rescue operation may have a greater dimension. For example, the British ship "The Sibonga" which, in 1979, rescued 1,300 Vietnamese refugees in the South China Sea. In this case, the rescuer of the so-called "boat-people" (formed by people sailing in small boats under extremely perilous conditions), was required to carry them to the United Kingdom. During the voyage it was necessary to provide medical care, in particular to

children and the elderly, and other assistance was provided, which was beyond the functions of the master and crew.

In fact, the United Nations High Commissioner for Refugees (UNHCR) called upon States, in October 1978, to instruct ships to assist refugees at sea and asked coastal States to provide at least temporary asylum to them. IMCO was asked to support these actions because of its close links with the shipping community.

Thereafter, an appeal to governments and shipowners to help "boat-people" of South-East Asia was issued jointly in December 1979, by the UNHCR and the Secretary-General of IMCO. The joint appeal referred to the perilous situation and read:

> "Many have been rescued in high seas from sinking or unseaworthy craft. Some report that vessels ignored their distress signals. Others have therefore perished not only because rescue was not at hand but possibly after such disregard of their plight".

It must be taken into account that the joint appeal refers not only to rescue at sea but to assistance later on. Such action would contribute to saving life at sea by encouraging masters and owners of potential rescueing vessels to fulfil their humanitarian obligations.

Finally, to recognise the importance of the shore based organisation and air SAR assistance, in co-ordinating and initiating the required measures for saving life at sea, it is suggested that a possible contribution may be organised practices of SAR operations. The coastal State organizes a proper practice in its areas of responsibility with the participation of its own SAR units and all the ships in the vicinity of an assigned ship. The principal difficulty in this respect would be the cost involved in these operations and its required instructions from IMCO to the shipping community. However, these operations should be made by a voluntary State and carried by each State once each year. Futher, it is possible that by means of these "real" practices, the SAR services on the world might be improved substantially.

CONCLUSIONS

The international regulations for safety at sea form a solid base for the formulation of national measures in the hope that it will be possible to overcome many of the hazards which threaten ships and their cargoes. Saving lives and preventing injuries to crew and passengers is of prime importance.

The IMCO Conventions have been ratifield by a large number of its Member States and this number is increasing because of the widespread implications of maritime emergencies which affect not only a single ship but also other vessels, port installations and the environment. International mutual co-operation could resolve many of the problems involved.

Shipping has seen an extraordinary development in recent years, in the number of vessels registered and quantity of cargo carried. Technological improvements have brought new classes of special ships such as container and ro-ro. Another factor which must be underlined is the significant growth both in number of ships bearing flags of convenience and fleets of countries without a strong maritime tradition. In this situation, the inexperience of the crew leads to a condition which could at any time cause numerous casualties.

IMCO is taking steps to standardise training, certification and watchkeeping for seafarers, and to promote technical co-operation for those States which request such assistance.

It would be encouraging to aim in the near future for the prevention of all accidents, but it is more realistic to accept that this ideal is never likely to be achieved. In fact, despite the advancements made in the adoption of safety measures, statistics reveal an extraordinary increase in the number of seamen killed and injured in recent years. On this point, it must be taken into account that the sea will always be a hazardous place and dangers will always exist.

Security measures which have been taken so far have a preventative character and the disadvantage is that they are not sufficient to dimish the effects of an accident when it occurs. They do provide a basis for establishing responsibilities and sanctions (if any) after such an event. However, the acceptance of the International Convention on Maritime Search and Rescue, 1979, will give operational co-ordination of SAR activities when a maritime distress occurs and so should remedy the

existing regulations.

There is certainly nothing new in saving life at sea by means of a ship-to-ship rescue. Serious problems may arise in these circumstances due to difficulties in communications between vessels, poor weather conditions or lack of experience in SAR operations. Vessels are well equipped for their own emergencies, but using this apparatus for assisting other vessels is not the same.

There are two considerations adding to the difficulties above. Firstly, the problem of not receiving a distress alert from a ship in danger has been partly solved by the AMVER System which has been developed by the United States of America with undoubted success. In this system a ship voluntarily supplies a sailing plan and periodic position reports, free of charge. A central computer collates the information to give a continuous surface picture. If an emergency arises, this information can be used to assist in co-ordinating the rescue operation. However, this system suffers from the drawback of a poor short and middle transmission from/to the ship in distress. The international solution to these problems has been drafted by the SATNAV's system which is operated by the INMARSAT Organisation. This system provides a global communications network. It is hoped that by the 1990's a "Global Maritime Distress and Safety System" will be fully operational, and there are already three satellites operating at present under a provisional plan until the implementation of a global coverage.

Secondly, improving the effectiveness of SAR operations has been brought about by shore-based co-ordination for specialised aircraft and ships. The SAR area of responsibility for each country, in principle, has been assigned from the International Civil Aviation Organisation (ICAO) regulations on aircraft rescue at sea. At the same time the operative norms for air SAR operations have been adopted for maritime SAR from manuals already in use, so that optimum co-ordination of effort is achieved, as has been the experience even now in some countries.

The two points discussed above do not detract from the important value of the ship-to-ship rescue. In fact, they enhance it. The improvement in communications between ships has obvious value and the shore-based rescue is aided by the presence of other ships in the vicinity of one in distress. The whole operation being under the co-ordination of one shore station endowed to this effect.

The 1979 Convention offers the advantages indicated above and therefore it is hoped that it will come into force without any delay.

Meanwhile the authorities concerned are taking steps to crystallize these proposals. In 1982, for instance, a conference will be held to fix the new frequencies for a provisional draft system and the future Global Maritime Distress and Safety System and many maritime countries are developing co-ordinated shore-based organisation for SAR. Industry is developing the devices required and the general consensus of opinion is that the new SAR organisation will become a reality.

In the application of the 1979 Convention many factors have to be taken into account, and certain aspects may be emphasized in order to enable SAR operations to be mounted as quickly and effectively as possible. Some of the more important aspects are as follows:
(a) Statistics . Safety at sea improved by means of international regulations from IMCO, ILO and other bodies. However, statistics on accidents at sea are showing an increasing number of fatalities. Therefore, it is necessary to establish the 1979 Convention in order to alter this trend.

The establishment of a centralized international statistics centre on death and injury to seafarers and passengers is an important requirement and will provide a measure of the SAR services' effectiveness. IMCO has initiated recently, the collection of data on tanker incidents.

The aim could be to adopt an international standard format for computational statistics and IMCO may organize this "Seafarers Statistical Centre", collecting data from all bodies involved. As an alternative IMCO could form an "International Shipping Statistics Centre" collecting data on seafarers, ships and cargoes, from which much information on the effectiveness of shipping regulations may be obtained by expert analysis.

(b) Communications . Maritime communications are already contributing substantially to improve efficiency to SAR operations. Nevertheless, certain deficiencies in maritime communications at short and medium distances have been improved by means of the use of long range satellite communications. INMARSAT is the organisation in charge of establishing a global implementation and it is hoped that it will be realised in 1990. However, a provisional draft system will soon ensure the reception of automatic distress messages from ships in distress and the communications capabilities to co-ordinate the rescue of survivors. The changes needed to the existing radio regulations should be ready in March, 1982 and will be discussed and laid down by a World Administrative Radio Conference for Mobile Services. The implementation of the new regula-

tions involved will be fundamental for maritime States in order to develop the Global Maritime Distress and Safety System.

(c) Co-ordination . SAR operations based ashore benefit by means of a co-ordinated organisation between maritime countries. Each State SAR organisation has special ships and aircraft to assist a ship in distress in its assigned area of responsibility.

A mutual co-ordination from SAR services is a Resolution of the Convention. It could be improved to a uniform standard by means of the International Conference of Lifeboats Institution, Symposiums on SAR organisation, Technical Co-operation Programmes, Publications, etc. under the guidance of the IMCO and the collaboration of non-governmental organisations.

The 1979 Convention was elaborated in order to permit the necessary adjustment to its implementation. The SAR organisation of the United Kingdom and Chile have shown that it is possible to improve measures in accordance with their own resources. Notwithstanding. it must be made the responsibility of one body to increase its efficiency and to derive the mutual benefit of co-operation from other bodies of the country.

The same concept should be considered in the international SAR co-operation. For example, the European Economic Community should improve the 1979 Convention by reorganisation of its Member States' Coastguard. The objective of this change is to produce a uniform standard in all aspects of the scheme. Perhaps the European Parliament recommendation, made in 1978, in order to form a fleet operating under the Community emblem for the purpose of patrolling the Community fishing zone, preventing marine pollution and ensuring the application of other rules falling within the framework of an overall policy on the sea, should be in the opinion of the Author more efficient for each country, retaining its own system while applying uniform standards and co-operating fully.

(d) Maritime Law . There are international and national laws to establish a duty to assist ship-to-ship in cases of distress, and other regulations to improve mutual co-operation between countries in SAR operations. However, the Brussels International Convention, 1910, needs to be revised in the opinion of the Author to distinguish between salvage and life-saving. The former must be considered as voluntary when there is a salvage contract between the parties and the latter as a duty without any financial award except when it is part of a salvage contract.

There is a need to revise other laws to establish common regulations in the maritime field. The current laws applying to the rescue of a ditched aircraft's crew and passengers are in conflict. Under maritime law there is a duty and no remuneration, while under air law it is rewarded. For example, see the provisions in Britain of the Section 51 of the Civil Aviation Act. 1949 and the Section 3 of the Administration of Justice Act. 1956. However, under international law, the moral and policy difficulties involved in the creation of a personal life salvage liability may suggest that, subject to provisions of public and private bounty, it would be an undesirable legal development.

(e) SAR Areas of Responsibility. The allocation of areas of responsibility will be discussed in the World Administrative Radio Conference for the Mobile Services, 1982. The draft alternatives to lay down are based on longer areas assigned to some maritime countries which are already in a position to organize SAR operations with the co-operation of other countries involved. However, it does not alter existing maritime jurisdictional areas. Changes in designed areas of responsibility may be envisaged in the future in order to improve further, the SAR organisation.

(f) The EPIRB System. The EPIRB System is an important help which, in contact with water, automatically provides geographical co-ordinates from a ship in distress. However, technical advances are improving many devices and it is possible that the cost of them will fall. Therefore, it is possible that many people will acquire EPIRB apparatus and misuse may lead to saturation of the satellite channels. International regulations may be necessary to restrict the availability of the transmitters or to control very carefully the frequencies available.

(g) Publicity. There is an international consensus to improve the SAR organisation. However, the 1979 Convention needs time to establish its implementation in each State and so far, three countries have ratified it. The implementation concerned meanwhile is improved by the MERSAR and IMCOSAR Manuals. However, it is necessary to publicise the SAR organisation at all levels in order to produce an awareness of its effectiveness and to ensure the active participation of all countries. In particular it is essential for individuals participating in all types of SAR service to improve their efforts. The annual establishment by IMCO of an international SAR award for the best technical efficiency could be an important step in this respect.

(h) SAR Training. The Convention on Standards of Training, Certification

and Watchkeeping for Seafarers, 1978, could be improved with "SAR Organisation Courses" at different levels in order to provide the necessary skill on this matter. Obviously, the same principles will be applied to the Coastguard and other bodies concerned in each country. It is important to include the SAR organisation in scholls programmes in order to promote the common interest of the communities.

Perhaps organised practices of SAR operations could provide important experience for the authorities and facilities involved.

(i) Global SAR Service . In SAR operations no distinction is made on grounds of nationality, ship's flag or membership of particular organisations such as INMARSAT.

The same impartiality is demonstrated in the rescue of refugees in danger at sea. This attitude must be a permanent requirement if the Global Maritime Distress and Safety System is to be improved.

(j) SAR Appliances . The recommended life-saving appliances for lifeboats, aircraft, ships and other SAR facilities could be included in the SOLAS Convention, 1974, in order to obtain uniform efficiency for SAR operations throughout the world. The same policy should be applied in lifeboat design.

(k) Tacit Acceptance Procedure . The 1979 Convention has the advantage that amendments in existing international regulations can be made by the "tacit acceptance procedures". When the Convention is ratified, therefore, adjustments to regulations can be made in a relatively short time. Perhaps this procedure will eventually be applied retrospectively to all previous conventions.

(l) Oil Platforms . The implementation of the 1979 Convention could be extended to the general maritime field where human lives are in danger. In this way for example, the oil platforms and other devices at which workers are under maritime risks, would have the equipment required to provide alert to the SAR organisation and receive opportune assistance to the workers in danger. In other words, the SAR organisation would be on the maritime field and not only for ships in distress. A proposal that trials of Emergency Position Indicating Radio Beacon (EPIRBs), which is co-ordinated by the authorities involved will serve as a guideline for the future international development of such measures.

(m) IMCO Functions. There is a body of opinion that IMC , the future

name for IMCO as from May 22nd, 1982, should have the power of an international court in order to enforce its regulations. However, the Member States policy is to maintain its technical functions. At the present a discussion of a political nature is delegated to other entities and so does not interfere with the IMCO's activities.

Safety at sea measures require a concentrated dedication to the exclusion of other interests.

However, it is worth noting that in some countries, seamen are not adequately protected from hazards. Therefore, if the IMO status is changed, by a majority of its Members, to provide IMCO legal powers to intervene, it may resolve these problems.

Many of the measures discussed above are developed by IMCO and other bodies, and fortunately they have strong links between them for the consolitadion of safety at sea.

It is hoped that these conclusions have made clear the steps taken so far and the evidence of a possible success of the 1979 Convention. It is apparent that its future development depends on the mutual co-operation of all elements of the shipping community.

YEARLY ANALYSIS OF DEATHS AMONG CREWS FROM ALL CAUSES: 1963 TO 1977

"Casualties to vessels and accidents to men". DoT. Published in 1978 and 1980

CAUSE OF DEATH	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Deaths from casualties to vessels												
Foundering	–	15	4	13	–	3	3	30	4	4	6	7
Stranding	–	1	–	13	–	–	–	–	–	–	–	–
Collisions	3	5	9	24	–	–	4	–	–	65	3	–
Missing Vessels	–	–	–	–	42	–	–	–	–	–	–	–
Explosions and fires	–	7	4	18	3	6	6	2	3	5	6	6
Other casualties	5	–	–	–	–	–	–	–	7	1	4	–
TOTAL	8	28	17	68	45	9	13	32	14	75	19	13
Deaths from accidents other than casualties to vessels												
Accidents on board	55	44	49	54	33	32	37	45	25	20	30	34
Accidents ashore	36	49	36	31	29	17	22	13	28	24	31	30
Death from homicide	5	5	3	5	9	2	1	5	5	5	2	7
Death from suicide	32	22	22	18	27	19	19	30	31	25	13	17
Missing at sea	12	22	16	18	29	17	20	14	10	15	22	11
Deaths from disease	203	171	173	141	153	136	162	137	134	127	110	118
TOTAL	343	313	299	267	280	223	261	244	233	216	208	217
FINAL TOTAL	351	341	316	335	325	232	274	276	247	291	227	230

CAUSE OF DEATH	1975	1976	1977
Deaths from casualties to vessels			
Foundering	24	-	-
Stranding	-	-	-
Collisions	1	-	-
Missing Vessels	-	8	-
Explosions and fires	7	5	3
Other casualties	1	1	-
TOTAL	33	14	3
Deaths from accidents other than casualties to vessels			
Accidents on board	38	32	37
Accidents ashore	27	14	3
Death from homicide	4	6	-
Death from suicide	22	4	6
Missing at sea	6	12	12
Deaths from disease	105	65	71
TOTAL	202	133	129
FINAL TOTAL	235	147	132

YEARLY ANALYSIS OF DEATHS AMONG CREWS FROM ALL CAUSES: 1963 TO 1977

CAUSE OF DEATH	1963	1964	1965	1966	1967	1968	1969	1970	1971
Deaths per thousand seamen at risk									
Deaths from casualties to and accidents on board vessels	0.8	1.0	0.9	1.4	1.1	0.6	0.8	1.0	0.6
Deaths from all causes	2.9	2.9	2.8	3.2	3.2	2.5	3.0	3.1	2.8
Estimated number of seamen at risk on average each year (thousands)	123	118	112	106	101	93	91	90	88

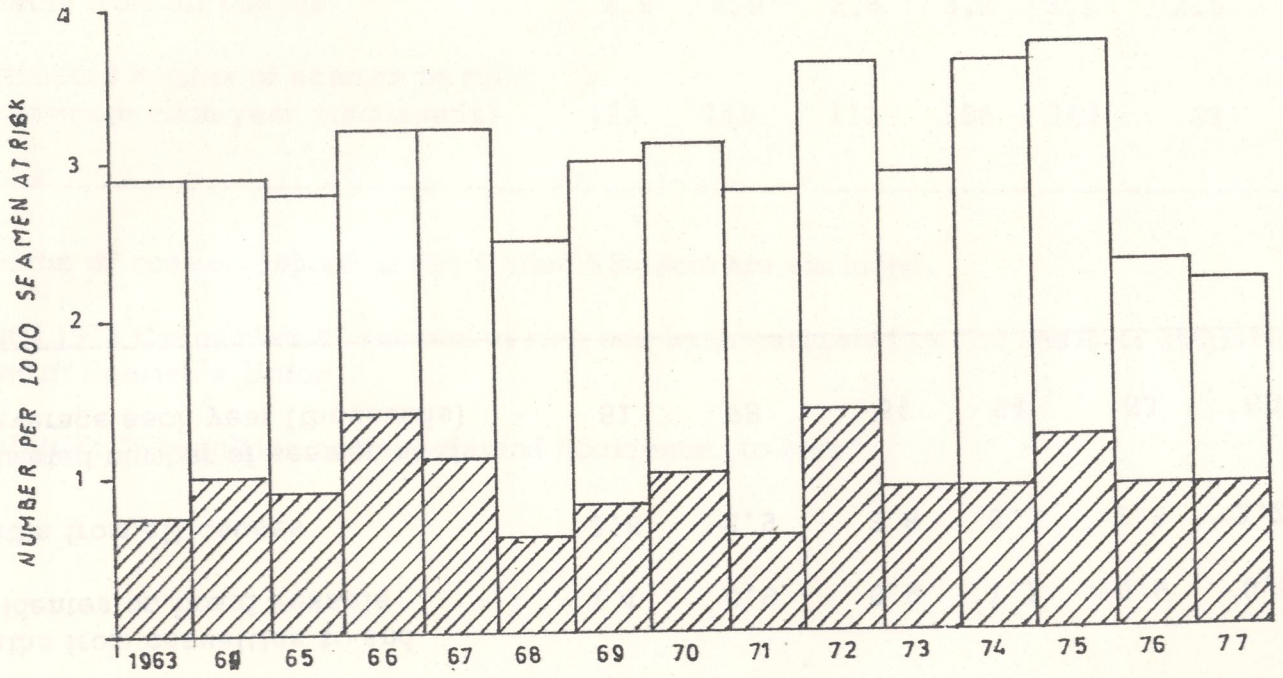
Deaths of seamen ashore in the United Kingdom are excluded.

Until 1973 the number of seamen at risk has been estimated on the basis of statistics from the Cardiff Seamen's Union.

SOURCE: "Casualties to Vessels and Accidents to Men"

CAUSE OF DEATH	1972	1973	1974	1975	1976	1977
Deaths per thousand seamen at risk						
Deaths from casualties to and accidentes on board vessels	I.4	0.9	0.9	1.2	0.9	0.9
Deaths from all causes	3.6	2.9	3.6	3.7	2.3	2.2
Estimated number of seamen at risk on average each year (thousands)	81	78	64	64	63	60

Chart- "Deaths among crews"



STATISTICS CHECKED BY IMCO AND LLOYDS REGISTER ON NUMBER OF LIVES LOST BETWEEN 1968 AND 1979

UK Tanker Safety Group

YEAR	NUMBER OF LIVES LOST
1968	98
1969	124
1970	88
1971	127
1972	220
1973	65
1974	84
1975	115
1976	119
1977	73
1978	155
1979	255
TOTAL	1.523

LIVES LOST DUE TO SERIC US CASUALTIES BY CATEGORY OF CASUALTY

(Tankers of 10,000 dwt and above)
1968-1979

CAUSE	NUMBER	%
Cargo tank fire/explosion	342	22
Collision #	314	21
Ship sinking	198	13
Missing ships (no known or suspected cause)	147	10
Men working in tanks	125	8
Deck fire/explosion	101	7
Engine room fire/explosion (ship under repair)	97	6
Engine room fire/explosion (ship in service)	59	4
Structural defect followed by cargo space fire/explosion	42	3
Other fire/explosion (includes accomodation fires)	31	2

CAUSE	NUMBER	%
Machinery troubles	25	2
Pumproom fires/explosions	17	1
Other causes	25	1
TOTAL	1.523	100

Fire and explosion following collision caused 301 out of the 314 lives lost due to collisions.

"Merchant Ships Totally Lost Consequent Upon Casualty I959/I979". Lloyd's Register Returns, I979.

All Losses

(Burnt, Collision, Foundered, Wrecked, etc.)