

The International Maritime Organisation and national administrations

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SYNOPSIS

The paper examines the relationship between the International Maritime Organisation (IMO) and its 132 member states with particular reference to the making of regulations relating to marine safety. It shows that legislation emanating from 'IMO' is solely the result of proposals submitted by one or more of its Member States. It describes how these submissions are considered in detail and moderated by the specialist subcommittees of experts from the Member States. The relatively small permanent staff of IMO provide the 'machinery' which permits the organisation to operate as speedily as the procedure laid down by the Member States permits.

The professional staff of IMO draft reports of the meetings, provide and introduce position papers, give advice to the delegates and liaise between the subcommittees. They act as secretariat and an executive carrying out the wishes of the members but they neither make proposals for legislation nor decisions on when it will enter into force.

The advantages and disadvantages for individual national administrations of the international approach to Maritime Safety and Pollution Prevention made possible through IMO are examined together with the pressure imposed on the organisation following serious casualties.

INTRODUCTION

At the turn of the century maritime safety and pollution prevention legislation was limited to the relatively small number of nations with merchant fleets of significance. For example, representatives from just 13 countries attended the International Conference convened by the UK in London in 1913 following the report of the Court of Formal Investigation into the loss of the *Titanic*.

The national safety legislation of these countries invariably resulted from the pressure of public opinion often on governments who, mindful that every regulation is a restraint, were reluctant to place the burden of legislation on its designers of ships and machinery and its operators. Consequently, the legislation was based mainly on the major casualties suffered by that country rather than a consideration of potential hazards or even on an objective assessment of the casualties suffered by the world fleets as a whole. Similarly, the major maritime countries developed their own systems of approval of life saving and other equipment based on the experience gained from casualties to their ships, and the approved designs resulted from the expertise and practices of their major manufacturers independently of their counterparts in other countries. These regulations and requirements were initially applied only to the Flag State's own vessels.

There were, however, areas where legislation applying only to a country's own ships could not be relied upon to protect the passengers and crews of its ships and, eg, the first statutory collision regulations incorporated into UK legislation (Steam Navigation Act 1846) were applied to foreign ships in UK waters. In 1863, more comprehensive rules, produced by the French and British administrations received a wide measure of international acceptance and much of their content survives to the present day. Surveyors were empowered to inspect foreign vessels in UK ports to ensure that their lights and sounds signals complied with the regulations.

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Following a traditional engineering apprenticeship, he served as an Engineer Officer in the Merchant Navy, obtained an Extra First Class Certificate of Competency and joined the Marine Survey Service as an Engineer and Ship Surveyor in 1952. He has served in various positions including those of Chief Examiner of Engineers and Engineer Surveyor-in-Chief.

At the International Maritime Organisation of the United Nations, Dr Cowley served as the Department of Trade Chief Adviser at the 1978 Conference on Tanker Safety and Pollution Prevention and has led the UK delegation at the Fire Protection Subcommittee meetings. He led the delegation at the Maritime Safety Committee and the Marine Environment Protection Committee until he was elected Chairman in 1984.

Dr Cowley has served on or chaired a number of committees concerned with professional institutions, education and learned societies, including the former Joint Committee for National Certificates and Diplomas and City and Guilds Committees. He is a past Chairman of the ERB/CEI Technician Engineer Board and served on the Board for Engineers Registration of the Engineering Council and was Chairman of Executive Group 5 until February 1988. At the Institute of Marine Engineers he has served as a Council member for some 20 years and is the immediate Past President.

Dr Cowley is a visiting professor and a member of the Board of Governors of the World Maritime University. He is the author of a number of technical papers and was awarded the Denny Gold Medal in 1982 for his paper on 'Steering Gears - New Concepts and Requirements'. He was awarded the IMO International Maritime Prize in 1988.

Apart from the responsibility for the safety of a country's own nationals on its own ships, there is the humanitarian obligation to the seamen and passengers on unsafe foreign ships sailing from a country's ports. Whilst this responsibility is not in dispute, interference with the property of another state, even in a port within one's jurisdiction is a serious matter. Thus, for example, when the UK took the power in 1906 to apply its national regulations for life saving equipment to foreign ships in its ports, the legislation did not apply to those foreign ships for which 'the provisions in force appear to be as effective as the provisions of the principal (UK) Act'.

Similarly, under the same (1906) Act, an appeals procedure and recompense for unreasonable detention of foreign (and British) ships deemed to have been unsafe were incorporated in the legislation.

In addition to concern about potential loss of life, a commercial disadvantage may accrue if, eg, a country requires the provision of more expensive safety equipment or restricts the depth of loading of its ships compared with practices of its competitors.

A need for international agreement in the case of pollution prevention is also evident. Whilst a country can make regulations covering ships within its territorial waters, pollution does not respect such geographical limits. Discharges of oil, dangerous and noxious substances (in bulk and packaged form) and garbage discharges on the high seas must, therefore, from environmental considerations, be controlled by internationally agreed and implemented standards.

THE INTERNATIONAL MARITIME ORGANISATION

Until the IMO was established in 1958, this need was met by a number of international conventions almost invariably resulting from conferences held in London attended by delegates from a limited number of (mainly) developed countries. Table I shows, *inter alia*, that, in the case of three such Safety of Life at Sea (SOLAS) Conferences, the number of countries represented were 13, 18 and 30 for the 1914, 1929 and 1948 SOLAS Conferences respectively. Today, some 130 countries are represented at the IMO and this wide representation makes the organisation truly international in character. However, not all countries have ratified all the IMO conventions.

Ratification involves both privileges and obligations but before ratifying, a country must be in a position to meet the requirements of the convention as included in its Articles and Regulations. In particular, the regulations have to be met before a convention certificate can be issued. Other parties to the convention will have to accept this certificate (unless there is good reason to suspect that the ship does not meet the convention requirements) and allow this ship to trade freely to their ports. At this stage, however, it is convenient to examine just some of the duties and responsibilities of national marine administrations. The subject has been dealt with in greater depth elsewhere.¹

Fig 1 gives an outline sketch of some of the duties of a marine administration in a form relevant for this discussion. Some explanation is appropriate. For example, International Labour Organisation (ILO) conventions are not specifically mentioned although they are included in the 'fixed' duties of a Flag State in respect of both its own ships (extreme left hand leg of Fig 1) and concerning the 'Safe operation of ships in port' (extreme right hand leg of Fig 1). This 'safe operation' box has, for convenience, been included under 'Coastal' state duties since it is relevant to both an administration's own ships (Flag

Table I: Summary of SOLAS conferences

Convention (Number of delegations attending)	Date adopted	Entered into force	Comments
SOLAS 1914 (13)	1914	Never	First World War outbreak
SOLAS 1929 (18)	1929	1933	Passenger ships: radio; subdivision; LSA; fire protection; navigation; collision regulations.
SOLAS 1948 (30)	1948	Nov 1952	Passenger ships: fire protection; subdivision; essential services; cargo ship safety certificates.
SOLAS 1960 (55)	June 1960	May 1965	Casualty procedures. Extension of passenger ship requirements to cargo ships.
Amendments	1966 1967 1968 1969 1971 1973	Never	Explicit procedure. Insufficient ratifications.
SOLAS 1974 (71)	Nov 1974 (Tacit acceptance hereafter)	May 1980	As SOLAS 60 plus amendments – 1966–1973. Principally fire protection, detection and extinction.
Protocol 1978 (62)	Feb 1978	May 1981	Surveys, control of ships, steering gear control systems. Inert gas for oil tankers. Radars.
Amendments 1981 (70)	Nov 1981	Sept 1984	Hull and machinery chapters rewritten; tanker steering gears. Extensive fire protection; navigation equipment.
Amendments 1983 (48)	June 1983	July 1986	Chapter III. LSA completely rewritten. Mandatory codes for gas and chemical tankers.
Amendments 1988 (61) and (56)	April 1988 Oct 1988	Oct 1989 April 1990	UK passenger ferry safety proposals. UK passenger ferry safety proposals.
Diplomatic conf (75)	Nov 1988	Feb 1992	Global Maritime Distress and Safety System
Diplomatic conf (72)	Nov 1988	Feb 1992	Harmonised system of surveys.

State duties) and foreign ships (Port State duties). It must be mentioned that IMO and ILO work closely together on matters of mutual interest. 'Pollution clean-up' and 'Search and rescue' are included under 'Coastal State duties' since they may

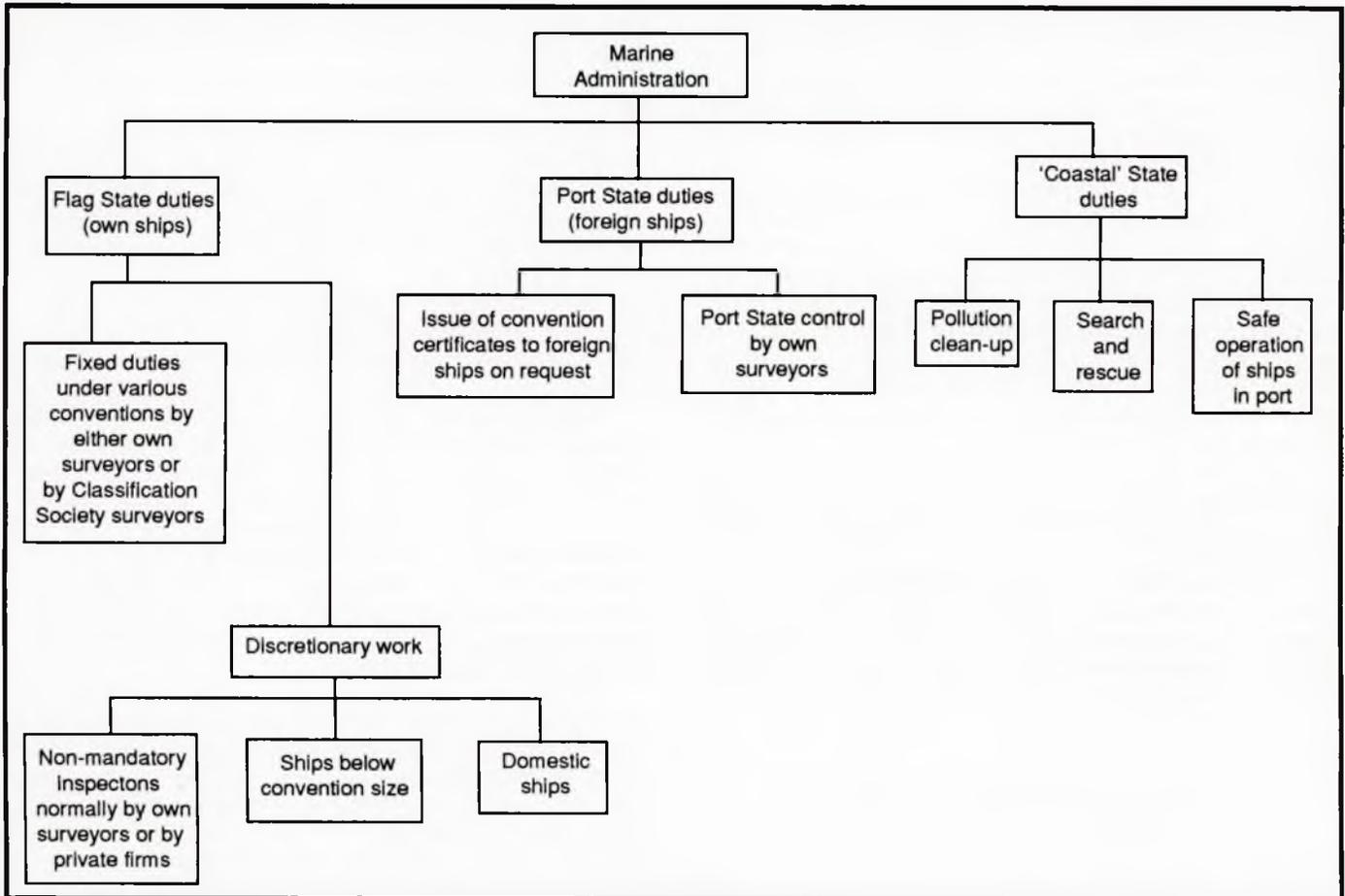


Fig 1: Some duties of marine administrations

relate to foreign ships which are not visiting an administration's ports.

The diagram must be interpreted with discretion because of the inevitable degree of overlap between the boxes and because all conventions are not equally applicable. For example, the 'collision' regulations apply to ships of all sizes and to domestic ships. Whilst the pollution convention 'MARPOL 73/78' applies to all ships, ie, it includes ships engaged on domestic voyages. This paper is concerned mainly with the 'fixed' duties of marine administration stemming from the work at IMO. The organisation has several objectives including the removal of certain discretionary or unfair restrictive practices, exchange of information between nations and technical co-operation. However, for the present purposes, its primary role is in encouraging the general adoption of the highest practicable standards in marine safety and pollution prevention matters.

IMO's relatively small permanent staff of about 250 persons, ie less than many marine administrations of its Member States, do not set the safety standards or make the regulations but provide the machinery to facilitate co-operation between them in producing agreed regulations from proposals made by those states. It is important to bear in mind that the conventions in which these regulations are contained enter into force on dates determined by the contracting governments. Under the terms of a convention, a contracting government may issue convention certificates to its ships or authorise other bodies to do so. These certificates state that the ship complies with the relevant convention requirements and other governments are expected to accept those certificates (unless there is some reason for assuming that the ship does not meet with the

convention requirements) and permit ships holding such certificates to trade freely to their ports. It is noteworthy that in addition to its publications on conventions' requirements, IMO prepares information manuals on a wide variety of safety and pollution-related matters. These manuals represent the combined knowledge and experience of all Member States and are of immense value to developing and developed countries alike.

OBLIGATIONS UNDER THE CONVENTIONS

A government's obligations under the conventions dealing with marine safety are of two main types.

1. As a Port State it must ensure that foreign ships visiting its ports are safe to proceed to sea and not likely to cause severe pollution.
2. As a Flag State it must ensure that its ships meet the standards of the conventions and that it carries out certain other duties in respect of safe manning, and investigates casualties to ships and reports to the organisation accordingly. These obligations apply to all ships entitled to fly the flag of the 'Flag State'.

The allocation of available resources between these two functions causes a major problem. The longer and more vulnerable the coastline and the greater the number of ship visits, the larger the proportion of surveyor resources employed on Port State control. This may mean the provision of a very large force

of inspectors even though the country has a relatively small fleet. On the other hand, some countries with relatively short coastlines have large merchant fleets and the proportion of resources employed on Flag State duties will be greater. For most countries there is a near balance and the same surveyors can be employed for both duties.

However, it must be recognised that no government has a marine administration extensive enough to perform all its obligations under the conventions and it is a question of judgement as to which of these obligations can be undertaken by organisations acting on its behalf. This delegation is permissible under the convention system but it does not relieve an administration of its responsibilities and, in particular, its obligation is clearly defined in Regulation 6(c) of the Protocol of 1978 relating to the International Convention for the Safety of Life at Sea, 1974, which states:

"In every case, the administration shall fully guarantee the completeness and efficiency of the inspection and survey and shall undertake to ensure the necessary arrangements to satisfy this obligation."

The problem for each administration is how to fulfil these international obligations for both Flag and Port State activities without excessive costs and perhaps with limited numbers of qualified marine surveyors. This matter is dealt with in greater detail elsewhere.²

NOMINATED SURVEYORS AND RECOGNISED ORGANISATIONS

In this paper 'surveys' refers to surveys for statutory certificate purposes under the convention and 'inspections' refers to Port State inspections of foreign ships and also to general inspections of an administration's own ships. Subject to the administration's guarantee mentioned above, the convention permits an administration to nominate surveyors or recognised organisations to conduct both surveys and inspections. In general, it may be said that Port State inspections are normally performed by government surveyors and general inspections are either performed by government surveyors or by private organisations (other than Classification Societies) or individual surveyors appointed by the administration. Statutory surveys are almost invariably dealt with by either government surveyors or by surveyors of the Classification Societies (who 'class' ships for insurance purposes).

As stated above, no administration has sufficient resources to deal with all statutory surveys required under the conventions without the assistance of the Classification Societies who maintain worldwide networks of qualified surveyors. Classification Societies are not normally used for inspection purposes as it may be considered invidious to have them checking on the standards on board a ship for which they have dealt with the statutory surveys.

The problems for administrations lie not in deciding whether to delegate but in deciding what to delegate. Traditional societies have a long history of issuing Load Line Certificates on behalf of administrations and, in fact, Regulation 1 of the Load Line Convention in referring to the general structural strength of the hull, states that: 'Ships built and maintained in conformity with the requirements of a Classification Society recognised by the administration may be considered to possess adequate strength'. In exercising this function and dealing with the structural strength of ships for classification purposes, the major Societies have established resources far in excess of those available to the marine admini-

strations of national governments. It is, as a consequence, the custom for the major part of the Load Line and Cargo Safety Construction Certificate work to be delegated to these societies.

On the other hand, many administrations retain the Safety Equipment Certificate (SEC) surveys and the Mandatory Annual Surveys (MAS) for their own surveyors. They may also employ their own surveyors to the greatest extent in the surveys of passenger ships, ships carrying liquefied gases in bulk, and chemical tankers.

The retention of SEC and MAS gives a regular presence on board their ships annually except in those cases where ships are trading continuously abroad for which special arrangements are necessary.

Countries having large fleets which do not trade to their own ports have particular problems if all statutory surveys are delegated to other bodies. These may be solved by either stationing government surveyors abroad (a very expensive solution) or employing private organisations and private individuals to check whether the SOLAS and other convention standards are being maintained. For example, in an effort to increase the standards on board its ships, one administration now employs some 400 private inspectors on a part-time basis at over 300 ports around the world.

The above mentioned procedures are very necessary as in general it may be said that administrations which delegate all statutory functions have casualty rates above the world average unless special measures are taken. This is not necessarily a shortcoming of the Classification Societies' surveyors as they have a duty to both the shipowner and to the administration and their presence on board is at the request of the shipowner. Classification Societies performing statutory functions should have back-up from administrations.

Apart from deciding the functions which might be delegated, the administration must decide which societies it will entrust to act on its behalf or whether to add to or reduce the number so authorised. It may not wish to limit its shipowners to one society because of the monopoly situation this creates, but too much competition in safety matters may be considered inadvisable. Much will depend upon the size of its fleet, the presence or otherwise of a national society which can meet its needs and the source of the ships generally coming onto its register. Other things being equal, an administration will wish to consider the service the Society is prepared to provide such as dealing with temporary non-compliance with the regulations following a casualty, the interpretation of the conventions and assistance in the issuing of exemption where this is left to the discretion of the administration, the approval of equipment on its behalf, the survey of unclassified ships, and the provision of information and calculations readily on request.

It is essential that the societies are clearly aware of the extent of the delegation afforded to them and IMO should be informed of these specific responsibilities. Administrations must give adequate guidance and this should be contained in a written agreement which states that the Societies are to survey to the minimum requirements of the appropriate conventions applicable to every ship according to its age, type and nature of voyage. Clear instructions should be issued laying down the action to be taken by the Societies' representatives in the event that safe and seaworthy conditions cannot be maintained on any ship or if it is suspected that they cannot be maintained. Societies should be aware of: those instances when an administration wishes its standards to go beyond the convention requirements; the administration's interpretations of the conventions' regulations; and the administrations attitude towards approval of equipment.

SHIP INSPECTIONS UNDER FLAG STATE AND PORT STATE PROCEDURES

In order to ensure that ships flying its flag are maintained to convention standards, it is necessary for a Flag State to carry out unscheduled inspections. The frequency and depth of these inspections will depend upon the number of times the ship is visited for statutory survey purposes and in this respect it is economical in surveyors' time if such inspections are carried out in conjunction with the statutory surveys.

The dates and details relating to any unsatisfactory conditions found during such inspections should be kept in a central survey record in order to make the most efficient use of resources by avoiding repetitive inspections of ships in good condition and concentrating efforts on those found to be below standard. In view of the similarity between these inspections and those conducted on foreign ships under the conventions' Port State control provisions, the form of the records could well be the same. There is, however, a difference in principle between the two types of inspections under the convention.

Whereas a Flag State may subject ships flying its flag to an inspection of any degree of severity to any standard it decides, its inspection of foreign ships should be limited to inspection of the ships statutory certificates which, if valid, should be accepted unless *inter alia* there are clear grounds for believing that the condition of the ship or its equipment does not correspond substantially with the particulars of any of the certificates. Again, in the event of deficiencies being found in the ship or its equipment, remedial action should be limited to the basic requirements of the conventions and not to the standards applied by the Port State to its own ships.

In an ideal world, Port State action would not be a major consideration as every Flag State would, by regular inspections, ensure that the ships flying its flag were operated at uniformly high standards in accordance with the conventions or, in the case of ships trading continuously outside its jurisdiction, the standards would be maintained by competent Masters and crews provided with the necessary resources. However, reality dictates that some Port State action is necessary, and even countries without significant tonnage will require inspectors to fulfil their obligations under the various conventions by co-operating with other parties in the detection of violations and ensuring that unsafe ships do not proceed to sea.

To make the most efficient use of resources by avoiding unnecessary inspection of the same ship, and ships which have been known to have (or be suspected of having) deficiencies, a regional arrangement for carrying out the requirements of the convention has been adopted by 14 European countries who have signed a 'Memorandum of Understanding on Port State Control'. Under this memorandum, each party agrees to conduct inspections on 25% of the ships visiting its ports during a 12 month period. This inspection rate means, in practice, that approximately 85% of all the individual ships using the ports in the region are inspected.

A system of recording inspections on a central data bank has been introduced. Surveyors, when deciding whether a ship should be inspected, first consult the computerised records to establish whether the ship has been subjected to an inspection in the region during the previous 6 months. If the ship has not been so inspected, the surveyor completes his inspection and, when everything is in order, gives an inspection report to the ship's Master before leaving. He then reports the result of his inspection to the computer centre. This co-operation and ex-

Table II: Port State Control inspections of foreign ships and general inspections of UK ships

Year	Number of inspections		Total
	Foreign	UK	
1977	677	1028	1705
1978	558	729	1287
1979	580	615	1195
1980	1301	993	2294
1981	2010	1020	3030
1982	2172	744	2916
1983	2442	545	2987
1984	2529	587	3616
1985	2532	731	3263
1986	2788	629	3417
1987	2385	650	3035

change of information between the partners eliminates waste of manpower and similar arrangements could be instituted in any region of the world. Table II shows the inspections conducted by the UK for the last 11 years.

Port State control and general inspections of ships have, in the author's opinion, played a major role in improving the standards of ships and in the prevention of casualties and loss of life. Unfortunately, casualties occur with ships which have (or would have been) cleared following an inspection, sometimes because the defective parts were inaccessible in a ship in operation (eg in gas dangerous spaces or loaded holds or tanks), or even in well found ships or well operated ships. The implications of casualties to ships are now considered.

CASUALTIES AND LEGISLATION

Since IMO is an organisation of its Member States, it is inevitable that it will face not only the problems of those states in the marine legislative field but will also have to cope with the differences of opinion within them. That it has been successful does not preclude an examination of potential problems or criticisms.

Just like its individual national administrations, as a marine safety legislative body, IMO is faced with a constant dilemma. If it produces regulations in the absence of casualties it is open to the criticism that it is a bureaucracy producing unnecessary and burdensome regulations. On the other hand, if a serious casualty occurs, it is criticised for not having promulgated regulations which would have prevented it. In fact, if it were doing a perfect job in preventing all accidents, it would never become known to the general public of its Member States. There are no doubt thousands of people in the UK, for example, who were unaware of the existence of IMO until the *Herald of Free Enterprise* disaster and, for many, the impression left by the media is one of a ponderous organisation which takes years to produce essential legislation. Yet, immediately following that same casualty, the 'organisation' in terms of its secretariat showed itself to be capable of a 24 hour response rate in the despatch of information to all member countries. In terms of executive action the organisation's secretariat can respond extremely rapidly.

The general question of the production of legislation by the organisation will be dealt with in a later part of this paper but at this juncture it is pertinent to examine the factors which lead to a perceived need for legislation.

THE FACTORS INFLUENCING LEGISLATION

Consequences

Many major machinery failures (eg broken shafts, loss of propellers) cause no deaths or pollution and consequently no proposals for legislation. Perhaps, illogically, it is the consequences of a failure rather than the magnitude of the initial failure itself which results in calls for legislative action. It is almost invariably the case that a combination of circumstances determines whether the initial incident results in a disaster (or does not develop, and is treated as a mishap), especially if deaths, injuries or pollution result. One burst fuel pipe has, for example, caused the constructive total loss of a major passenger ship (over 60% of fires in UK ships involving fuel or lubricating oil are due to burst pipes); however, many such failures have caused little or no damage.

Potential hazard

The *Amoco Cadiz* lost only its steering capability (as have many ships) but subsequently became a total loss through grounding (no lives were lost), although the master was evidently aware of the potential hazard from the low flash point cargo, and became a household name. On the other hand, another tanker lost all power in the Channel at approximately the same time following the fracture of a main steam valve. This was a more serious initial failure as the vessel lost all power but the positions of the ships and the weather differed sufficiently to make the difference between a major disaster and an engine breakdown which was not reported by the media. The two tankers had similar sized crews and the potential for loss of life was the same; only the environmental circumstances were different. Every seafarer will, no doubt, recollect similar instances from his own experiences.

The UK Department of Transport have issued a Merchant Shipping Notice requesting the reporting of potentially hazardous incidents and may make this mandatory. How seafarers will respond is a matter of conjecture. One difficulty is that there is no quantitative basis for assessment of potentially dangerous incidents and the subjective judgements of different seafarers on similar incidents would mean a variety of reporting standards. In respect of reporting, the most straightforward incidents would probably be those involving physical 'near misses' due to navigational errors or failures resulting in ships passing close to each other.

Compelling need

Whilst potentially hazardous incidents could be quite helpful in illustrating a need of legislation there is, quite understandably, both nationally and internationally, a reluctance on the part of governments to introduce legislation. Every regulation is a burden and, for example, the Maritime Safety Committee and the Assembly of the organisation have decided that new regulations will only be introduced if it is shown that there is 'a compelling need' for them. In particular, regulations involving structural changes will not be made retrospective. It would not be easy, on the basis of 'near misses', to persuade legislators that a 'compelling need' for new regulations had been demon-

strated. More success may be achieved on the basis of a number of 'serious casualties' (the reporting of which is called for by IMO) and legislation would be even more likely to follow a single major casualty resulting in heavy loss of life or pollution.

Frequency and magnitude of casualties

For example, the IMO Conference on Tanker Safety and Pollution Prevention in February 1978 resulted from a series of 13 serious tanker casualties. Eight of these occurred in or around the USA and some resulted from the failure of the control systems of steering gears. The conference adopted a protocol to the then unratified 1974 SOLAS Convention. This protocol contained more extensive legislation than previously intended amendments to the SOLAS Convention awaiting ratification. Requirements for steering gears which had been developed during a long consultative period in the organisation's technical committees were included in the protocol as well as new regulations for steering gear control systems (whose failures had led to some of the casualties).

Approximately 1 month later, the single hydraulic circuit of the steering gear of the *Amoco Cadiz* failed with disastrous consequences. All such steering gears had single hydraulic circuits and, as a direct result, further steering gear requirements were introduced involving, *inter alia*, duplication of the hydraulic circuits or separation of the hydraulic circuit following a failure so that steering capability can be maintained. If the cargo had not been spilled, it is unlikely that the regulations would have been upgraded. It was the consequences of the failure which caused the change in the regulations for tankers and not the fact that the steering gear had failed.

This is not a recent situation. It has always been the case. But for the sinking of the *Princess Alice* in 1878 on the River Thames with the loss of 600 lives, the provision of a life jacket for every person on board every such ship may not have become a requirement until some other major casualty. That vessel met the rules of the day with just 12 lifebuoys for an allowable 936 passengers.

Similarly, lifeboat capacity for all on board may not have been made mandatory but for the loss of the *Titanic* in 1912. The *Titanic* carried 20 boats suitable for 1,178 persons and had a permissible complement of 3511 persons (2201 were on board at the time, 711 of whom were saved).

Location of casualties

Governments respond to public opinion which in turn is influenced by:

1. whether its own citizens are involved;
2. the proximity of the casualty to the country concerned.

Thus, the US Coast Guard is deeply involved in the standards of passenger ships carrying US citizens from its ports. President Carter was personally involved in the US initiative following the previously mentioned tanker casualties which occurred around the US coasts. Similarly, a UK ship casualty in the English Channel or North Sea rouses much more interest than a similar casualty in the Pacific Ocean. The loss of the *Penlee* lifeboat (8 deaths) and the *Torrey Canyon* are much more familiar to the UK public than the loss of the *Royston Grange*, a UK registered refrigerated ship with 73 UK lives lost near the River Plate, Argentina, following the collision with the tanker *Tien Chee*. Similarly, the UK passenger ferries, *European Gateway* (6 lives lost) and *Herald of Free Enterprise* (191 lives lost), casualties in 1982 and 1987 respectively, are household names compared with the loss of the UK passenger vessel *Dara* (238 lives lost) in the Gulf, off Dubai, in 1961, or the passenger ferry *Tampomas II* (666 lives lost) in the Java sea in

1981. In the making of steering gear regulations following the *Amoco Cadiz* disaster, it appeared to the author that those countries whose shorelines had been affected by that case, or in the past, were the most insistent on radical changes in the legislation. All these considerations aside, the infrequency of major casualties means that statistical data are lacking and makes the production of cost-effective regulations a virtually impossible task. It is reasonable to request a cost-benefit case to be presented with any proposals for increases in regulations but in the absence of statistical information from casualties, such a request cannot be met unless casualties have actually occurred or unless some quantitative basis can be developed from 'near misses'. Taking into account the problems of basing regulations on near misses and the above influences on calls for legislation following casualties, the difficulty of establishing a logical basis for regulations is evident. It is reasonable, as the Maritime Safety and Marine Environment Protection Committees have resolved, to require any proposals to be cost-effectively based. But, as has been seen, there are evidently difficulties in providing such a case given that the (fortunate) infrequency of major casualties does not provide sufficient statistical data for a full case benefit analysis (Figs 2, 3 and 4). Neither does the absence of casualties provide information on which of the existing regulations are actually effective in preventing casualties.

Nevertheless, despite this absence of data and the low frequency of accidents, it seems reasonable to concentrate on areas where large loss of life or severe pollution may occur.

THE POTENTIAL FOR LOSS OF LIFE

The potential for loss of life is, for a given incident, obviously greatest when large numbers of people may be involved. This situation occurs:

1. in passenger ships;
2. in offshore drilling rigs;
3. in ships in port areas or close to land when the effects of the accident may be felt beyond the confines of the ships (eg ships carrying explosives, liquefied gas, chemicals in bulk and low flash point oil cargoes).

Similarly, the potential for severe pollution is greatest in vessels carrying large volumes of pollutants.

These high risk areas will now be considered in somewhat greater detail and the organisation's recognition of these potential hazards will be examined.

Passenger ships

In addition to taking account of the potential hazards due to the large number of persons on board, passenger ship legislation must incorporate provisions covering the whole spectrum of the travelling public from the very young to the very old, from the able-bodied to the incapacitated and the invalids. It must recognise that passengers are unlikely to be familiar with the ship or indeed any ship. They may never, for example, have worn a life jacket, and their very presence presents a hazard in terms of the increased fire risk they bring to a ship. Even a man willing to put his life at risk by going to sea, or even crossing the Atlantic in a small boat, expects to be transported in safety when travelling as a passenger and, even if the ship sinks, passengers are expected to be saved. These factors and the difficulties of evacuation in the event of an accident, have led to extensive legislation, some aspects of which are dealt with elsewhere.³

Millions of people travel annually on sea voyages ranging from inter-island passages through short international voyages on passenger ferries to long international voyages on cruise liners. It was thus inevitable that IMO would direct much of its early attention to passenger ship legislation.

This work has, in the author's opinion, been well directed and successful. Legislation cannot be expected to prevent all accidents but it can mitigate their effects. Fire constitutes the greatest hazard on passenger ships and IMO has made steady progress. In the structural fire protection field the different philosophies of national authorities have been gradually combined and that process will be virtually complete when current discussions on the provision of sprinkler systems are concluded. Each risk has been addressed and protective measures taken as for example in the special category spaces of ro-ro vehicle decks to which passengers have access.

The value of this work has been well demonstrated in preventing fires reaching serious proportions or confining serious fires by fire-resisting bulkheads. On several occasions, full complements of passengers have been safely evacuated even though the ships concerned either sank or became constructive total losses whereas several hundred passen-

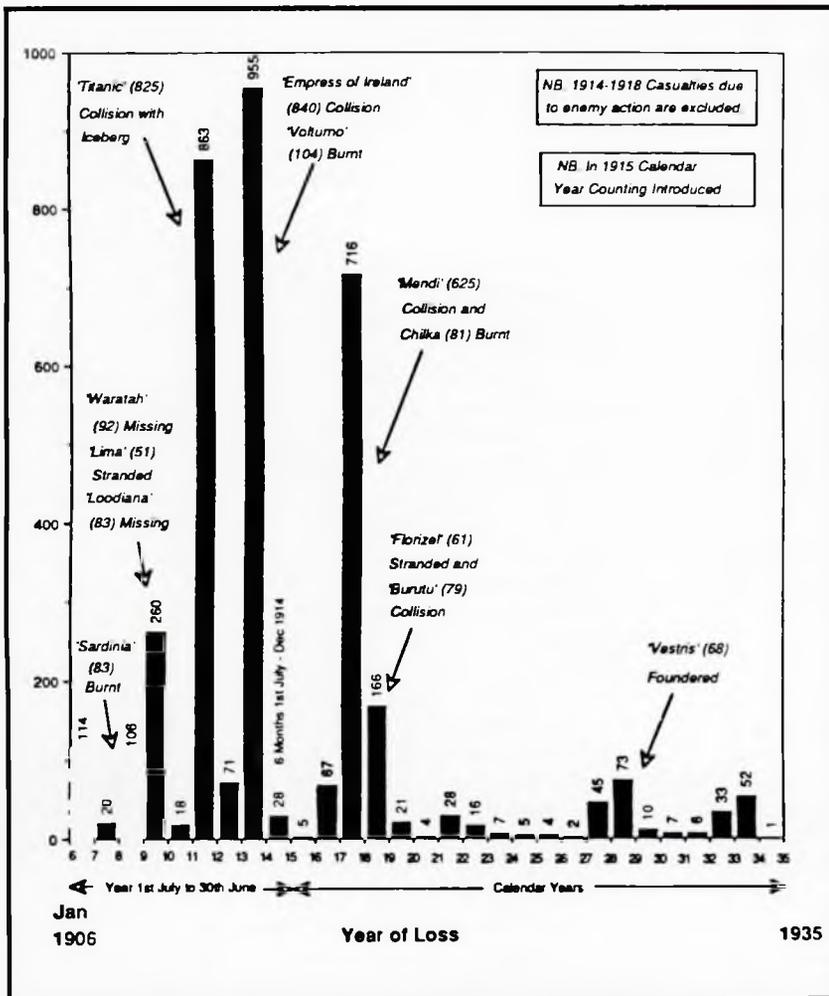


Fig 2: Passenger lives lost at sea (1906-1935)

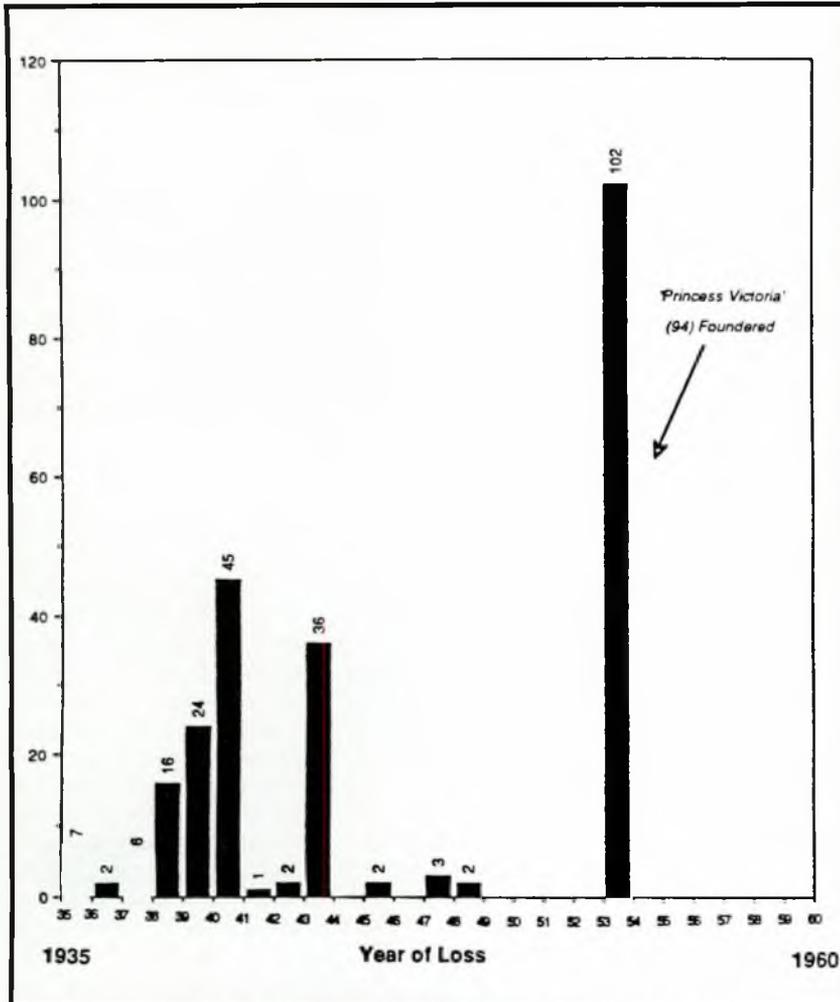


Fig 3: Passenger lives lost at sea (1935–1960)

gers have been lost as a result of fires in ships which did not meet the SOLAS requirements.

All IMO subcommittees are, of course, involved with passenger ship safety and bring their particular expertise to bear on each problem accepted by the Maritime Safety Committee as needful of study. The residual stability after damage is currently a major topic of interest on which the views of the subcommittee have been reported back to the Maritime Safety Committee for its consideration in respect of amendments to the SOLAS Convention.

It should be mentioned that items dealt with for passenger ships are included in the regulations for cargo ships where appropriate.

Mobile offshore drilling units

Mobile offshore drilling units (MODUs) are included in the definition of ships of the SOLAS Convention and must also conform to the national regulations of the different coastal states where they may be engaged in drilling operations. IMO recognised that the designs of these units are often quite different from those of conventional ships and that the requirements of the SOLAS and Load Line Conventions would not, in many instances, be appropriate.

In view of the large numbers of persons on board (ie at risk) and the different environments in which MODUs may operate, a Code for the Construction and Equipment of Mobile Offshore Drilling Units was developed. It is a comprehensive document

of 14 chapters dealing with the control, construction, subdivision and stability of all types of machinery installations, fire, life saving, radio communications, lifting devices, helicopters and operating requirements.

Compliance with the MODU Code and due certification may be accepted as meeting the requirements of the SOLAS and Load Line Conventions. It is kept under continual review and the latest revision is expected to be completed in April 1989. The MODU Code provides a good example of IMO's flexibility in adopting its procedures to meet changing demands.

Ships in port areas or close to land

The means by which protection of the public may be achieved include the following.

1. International legislation: by applying safety regulations and practices to all ships appropriate to the dangers they present.
2. National measures by:
 - a. preventing ships which cause a hazard from entering ports.
 - b. providing powers for the control of ships within ports and harbours.
 - c. making regulations and developing codes of practice for operations within ports, and providing powers of enforcement and prohibition to appropriate persons.
 - d. by enacting national laws which impose a duty of care on all persons.
 - e. requiring planning permission for shore installations which may be vulnerable to ship related activities.
 - f. developing port safety plans.
3. Conducting research into potential hazards.

Whilst at first glance, IMO's role may appear to be confined to 'international legislation' (point 1. above), such an impression would be in error.

The organisation's influence extends to other areas in many more instances than can be covered in a paper of this nature because it is obviously necessary to limit the extent to which ships have to be equipped or operated to meet the requirements of individual national and port authorities (which have consultative status at IMO). Whilst the provision of equipment used in port operations (such as, eg, an international shore connection for fire fighting purposes) can be included in the SOLAS Convention, the manner in which ships should be operated in port cannot be fully met by mandatory requirements.

To meet this problem and ensure that operating procedures are dealt with in as uniformly and as safe a manner as possible and that persons in port areas are protected, IMO has developed a number of non-mandatory codes of practice covering topics ranging from crude oil washing of the tanks of oil tankers to the 'Safe Transport, Handling and Stowage of Dangerous Substances in Port Areas'. These codes of practice supplement those provided by Industry and remove the need for each country to develop its own requirements.

The International Maritime Dangerous Goods (IMDG) Code is probably the best known and widely used code in international use as its provisions affect manufacturers and all handling and transport services up to the retail outlets or consumers. Manufacturers, packers, shippers and forwarders

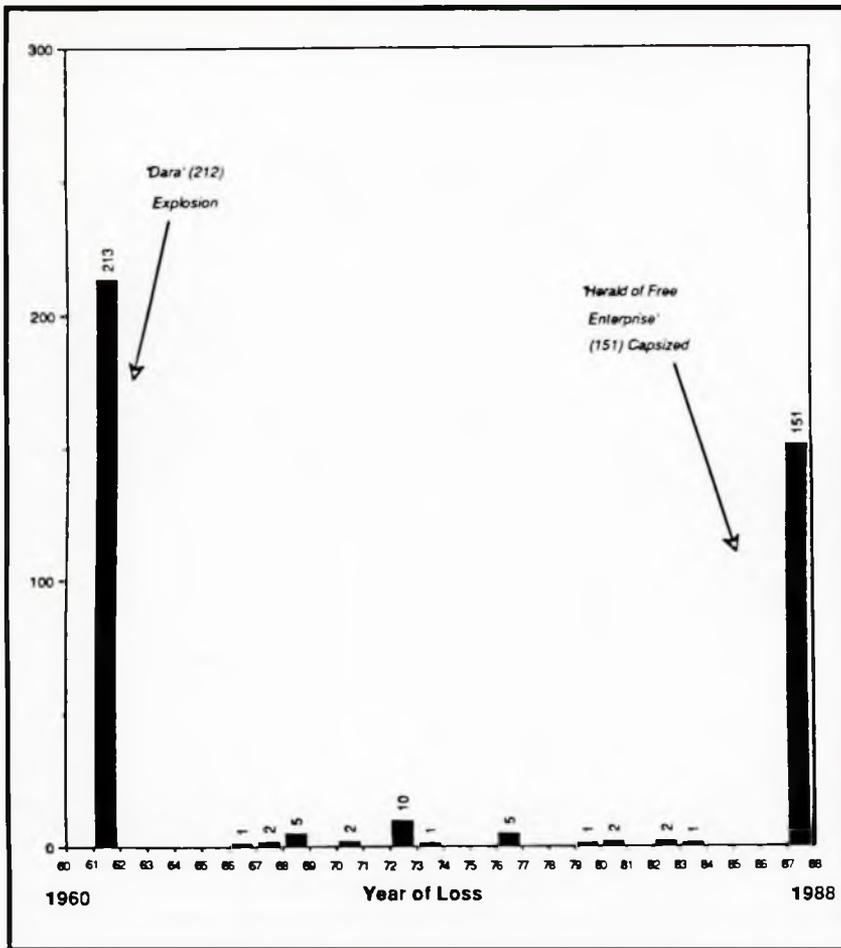


Fig 4: Passenger lives lost at sea (1960-1988)

are guided by its provisions on terminology, packing, identification and labelling. Feeder services such as road, rail and harbour craft are guided by its provisions in respect of classification, identification and labelling. Port authorities also consult the code to segregate dangerous substances in loading, discharge and storage areas.

The IMDG Code is published in five loose leaf volumes and can be expeditiously amended. Amendments covering hundreds of dangerous goods, comprising 400-500 replacement pages are the normal result of a Carriage of Dangerous Goods subcommittee meeting. Intersessional meetings of specialists are necessary to cope with the ever increasing numbers of chemicals being produced. These substances include, eg, poisonous and infectious substances, radioactive substances, corrosives and miscellaneous dangerous substances.

Before the introduction of the IMDG Code, individual national administrations attempted to maintain their own counterpart of the code but today this would be a virtually impossible task as each chemical has its own schedule containing information on its physical and chemical properties, marking and labelling, stowage, documentation and other information relating to its transport. Incidentally, the code has recently been amended to include 'marine pollutants' which are being identified using criteria developed by the Marine Environment Protection Committee.

The IMDG Code thus plays a major role in the protection of shore workers, in the safety of persons on beaches (due to its safe packing and its permanent marking requirements) if dangerous goods are lost overboard, and the prevention of pol-

lution as well as the safety of shipboard personnel. By utilising the expertise of all countries, IMO can perform this role in a more competent and comprehensive manner than any individual administration.

Ships close to land

Until the early 1950s, the dangers to shore populations from ships was mainly limited to those from the carriage of explosives and ammonium nitrate. The main disasters include the collision and subsequent fire and explosion of the cargo of 2600 tons of explosives of the *Mont Blanc* in Halifax Harbour, Nova Scotia, in 1917 with the loss of some 3000 lives and 9000 injuries, the fire and explosion of the ammonium nitrate being loaded into the *Grandcamp* in Texas City in 1947 with the loss of 468 lives and two light aircraft flying overhead, and the fire and explosion, again of ammonium nitrate, in the *Ocean Liberty* in the port of Brest only 3 months later with the loss of 21 lives.

The IMDG Code contains stringent requirements covering the carriage of explosives designated as Class 1, which is subdivided into five sections according to the hazard the substance or article presents. Particular attention is paid to stowage and compatibility, fire fighting techniques and emergency procedures - a policy which is followed throughout the code. It is most probable that, had the information now provided through IMO been available and followed, the above mentioned disasters would never have occurred.

However, as new methods of transportation are developed, new hazards are introduced which traditional legislation was not designed to meet. In the field of oil transport, for example, even after the First World War, converted dry cargo ships were fitted with large cylindrical tanks in their holds and carriage of oil in barrels was still common. By 1930, tankers commonly carried 10 000 tons of oil; by 1950, 16 000 tons; by 1956, 50 000 tons; followed by a rapid escalation in size to, in 1967, 200 000 tons. There was thus a potential hazard, both to the crews and persons ashore (eg *Betelgeuse* in Bantry Bay, Republic of Ireland in 1976; exploded whilst discharging crude oil with the loss of 50 lives on board and ashore).

The large tanks of the new generation of VLCCs necessitated the fitting of high capacity tank washing machines with the potential to produce levels of static electricity sufficient to cause explosions, as was produced by the phenomenon of 'sloshing' in the partially filled tanks in combination carriers. Following explosions in the tankers *Mactra*, *Marpessa* and *Kong Haakon* in 1969, for which the exact cause could not be determined, IMO was asked to take up the question. The organisation responded with the requirement for inert gas systems (normally using treated gas from the uptakes of boilers), and the entire outlook for the safety of tankers changed.⁴ The UK was one of the first countries to make their provision mandatory and the effect on the country's casualty record may be judged from Table III which indicates that more lives have been lost in the relatively few coal carrying vessels due to cargo space explosions than in oil tankers during the last 18 years.

Concurrent with the rising size of oil tankers was the

Table III: Lives lost due to fire and explosion in UK ships

Year	Area of loss of life							Total
	Ships under repair	Pump room	Comb carr	Tanker cargo spaces	Dry cargo spaces	Accomm spaces	Machinery spaces	
1966	—	—	—	18	—	1	—	19
1967	2	—	—	—	—	4B	—	6
1968	1	—	—	—	—	11C	3	15
1969	—	3	—	2	—	—	1	6
1970	—	—	—	—	—	2	—	2
1971	—	—	1	—	—	2	—	3
1972	—	—	—	—	1	—	—	1
1973	—	1	—	—	—	5	1	7
1974	13	—	—	—	—	2	3	18
1975	—	—	—	—	—	2	5A	7
1976	—	—	—	—	—	3	—	3
1977	—	—	—	—	—	2	1	3
1978	3F	—	—	—	—	3	—	6
1979	—	—	—	—	—	3D	1	4
1980	—	—	—	—	1H	1	2	4
1981	—	—	—	—	1H	—	1	2
1982	—	—	—	—	—	10G	3	13
1983	—	—	—	—	—	—	—	—
1984	—	4E	—	—	—	—	—	4
1985	—	—	—	—	—	4	—	4
1986	—	—	—	—	—	—	—	—
1987	—	—	—	—	—	—	—	—
Total	19	8	1	20	3	55	21	127

A, Four lost in single bunkering accident; B, includes two wives; C, includes five passengers; D, three lives lost due to cargo spillage into accommodation; E, includes two shore workers; F, three shore workers; G, 10 lost in a single fire; H, lost in vessels carrying coal.

increase in the bulk transport of chemicals and liquefied gas. IMO did not wait for disasters to happen before taking action. Codes of practice and the initially non-mandatory holding of a Certificate of Fitness was introduced. These are now mandatory and are issued after compliance with the onerous structural, survivability and equipment provisions. The effectiveness of these measures has meant that no major disasters in these ships have occurred. Their value was clearly demonstrated in the case of the fire on the *Yoyo Maru* No 10 following a collision in Tokyo Bay in 1974. The impact fractured two of the tanks containing naphtha (a flammable oil-like substance) which continued to spread to other such tanks. The vessel carried liquefied petroleum gas in her cargo tanks arranged along the central line and the heat caused these tanks to vent through the relief valves. Eventually, all the naphtha fires were extinguished, leaving only the small fires at the heat damaged piping or the relief valves burning.

During the towing operation out of the harbour 5 days later, naphtha was spilled and again took fire but the liquefied petroleum gas tanks still did not explode and the fire was essentially one of naphtha.

The final demonstration of the integrity and stability of the gas tanks was the difficulty experienced by the Japanese Defence Agency in sinking the vessel despite the use of shells, bombs and torpedoes.

The attention given by IMO to ships which may present a hazard to shore populations is fully justified from examples of experience on land. In the case of the Los Alfaques camp site accident in 1978, a leak from a road tanker transporting just 43 m³ of liquefied gas resulted in a fireball explosion causing over

150 deaths. By comparison, some ships carry well over 100 000 tons.

MARINE POLLUTION

The reduction in pollution from oil must rate highly in IMO's successes following the implementation of Annex I of MARPOL 73/78.⁵ Its predecessor, the OILPOL 1954 Convention, attempted to tackle the problem by establishing 'prohibited zones' in which oil/water mixtures containing more than 100 parts per million of oil were prohibited: this referred only to the so called 'persistent' oils. More significantly, it included limits on operational discharges but did not specify the provision of equipment needed to enable shipboard personnel to meet those limits.

The parent convention and its protocol of 1978⁶ introduced, for the first time, requirements specifying the equipment and the operational limits for all (ie both domestic and international) ships. Concepts, new to legislation, were introduced including the use of crude oil for washing cargo tanks,^{7,8} segregated ballast tanks which are entirely separate from the oil pumping systems and tanks (ie no mixing and thus no operational pollution), and clean ballast tanks for existing product tankers. These are but some of the MARPOL 73/78 requirements of Annex I which also include measures to reduce accidental pollution including protective location of ballast tanks and limitations of outflow.

As a result of improvements in tanker operating practices, and, by the 1969 IMO amendments prohibiting the unrestricted

discharge of oil outside the prohibited zones, operational discharge of oil was reduced from 1.08 M tonnes in 1973 to 0.71 M tonnes in 1981 and the full effects of MARPOL 73/78 are yet to be measured. According to a USA NAS (National Academy of Science) report, the strict implementation of MARPOL will reduce oil pollution to 0.2 M tonnes.

The convention is not limited to the prevention of pollution from oil and, under Annex II, includes requirements for chemical tankers. The provision of reception facilities for the large number of different chemicals carried (often on the same ship) was one of the many problems to be faced before the annex could be implemented. The difficulties were immense and major changes had to be made to the original text of the convention.

These problems were eventually solved in a cost-effective way mainly by the use of efficient stripping systems which reduce the quantities left in the tanks to negligible proportions. This has drastically reduced the need for reception facilities for the unwanted washings and delivered virtually all the cargo to the receiver. The additional cost of the extra equipment to the shipowner must, however, be recognised.

Of the optional annexes of the convention, Annex V, dealing with garbage, entered into force on 31st December 1988 and the necessary ratifications for Annex III dealing with harmful substances in packaged form are expected very soon. Although many ships have been voluntarily observing the requirements of these annexes, their formal implementation, particularly of Annex V, will result in a significant improvement in the marine environment.

GLOBAL CO-OPERATION PROGRAMMES

The preceding sections have mentioned but a few of the developments which have taken place since the formal inauguration of IMO. Major omissions include periodically unmanned machinery spaces, satellite navigation and communications, automatic radar plotting aids, high speed hovercraft and hydrofoils, and traffic separation schemes. These recent developments and the regulations introduced to ensure safe operation have placed greater demands on shipboard personnel. The sophisticated equipment has necessitated greater skills in the reduced complements on board. The necessary expertise and resources are not equally available in all countries and IMO has placed the highest priority in the provision of maritime training on a global basis.⁹

As the membership of IMO grew, an increasing number of members did not have the background of training and expertise of traditional maritime nations. IMO's technical co-operation programme therefore concentrated on the training of senior personnel of those countries in order that they might conduct their maritime affairs in an effective and independent manner. The organisation has created or developed training establishments on a worldwide basis according to the needs of regions. These include institutions, academies or national projects in Africa, the Arab states, Asia, Latin America, the Pacific, and Europe.

The World Maritime University opened in Malmö, Sweden, in 1983 and is a most successful project. It provides post-graduate maritime education for some 200 senior personnel mainly from developing countries. On completion of their 2 year courses, they will provide the expert administrators, surveyors and teachers for the marine administrations and colleges of their countries and further the objectives of IMO. The permanent teaching staff is supplemented by visiting

professors who lecture on their own specialities in the students' co-ordinated programmes (which include visits to shipyards, ships, factories and the offices of countries having significant marine administrations and survey services for on-the-job training). The cost to the University for the visiting professors is limited to transport to and from Malmö and a *per diem* whilst at the University.

To assist governments in the establishment and improvement of safety matters in the transport, handling and storage of maritime cargo, IMO maintains a small but effective team of regional and inter-regional advisers who will, on request, provide advice on a wide range of subjects. These advisers will identify the immediate needs of the country and assist in the meeting of those needs, if necessary, by arranging further assistance.

The organisation also has inter-regional advisers who, although based in London, spend most of their time abroad providing advice on safety measures in the transport, handling and storage of maritime cargo, and establishing and improving maritime training in general, submitting practical proposals based on specific investigations and identified needs.

They also participate in the preparation of plans for the organisation and modernisation of maritime training in accordance with the best international standards, including optimum location of schools, use of facilities, type and amount of equipment, qualifications and numbers of teaching staff. Much of their work is connected with the implementation of the Standards of Training, Certification and Watchkeeping (STCW) Convention. Model courses and teaching syllabi have been produced for the basic watchkeeping certificates for deck and engineering officers. These are being used as the basic reference documents for the development of syllabi and curricula in some countries.

Assistance to developing countries is also provided through seminars and training courses normally arranged on a regional basis and are aimed at administrators, senior technical officers and others who are responsible for implementing decisions reached within IMO.

In addition, IMO has taken part in several hundred different projects which have been designed to improve the maritime expertise of developing countries. They have covered a wide range of different activities, but the majority have been concerned with maritime training which is undoubtedly the single most important aspect of IMO's work in the maritime safety and pollution prevention field.

The STCW Convention which entered into force in 1984 provided the first attempt to establish minimum global maritime standards for seafarers (which all countries are obligated to meet or exceed). This was a major achievement and much of IMO's global co-operation programme has been directed towards assisting developing countries to produce personnel trained to meet its requirements and ensure that the standards of the conventions agreed at IMO are implemented effectively.

CONCLUDING COMMENTS

In this review of some aspects of the relationship between IMO and national administrations, I have been conscious of the fact that no single aspect could be adequately covered in a paper of this nature, and its preparation presented many dilemmas. As an example, IMO's global co-operation programmes could not, with justice, be omitted, yet they could not be covered to the extent that their importance justified, nor could appropriate reference be made to the generous contributors to their funding.

The relationship under discussion should more descriptively be stated as being between national administrations acting collectively at IMO and acting individually since 'IMO' does not make decisions nor take actions independently of its members.

Approbation or criticism of its actions (or lack of action) should be directed towards the member countries. If 'IMO' produces too many (or not enough) regulations, this is because its members have collectively agreed that the regulations were (or were not) necessary. If IMO takes too long to make amendments to its conventions, this is either because it is working to amendment procedures written into its conventions by its member countries or because too long is taken by them in producing regulations prior to the amendment procedure.

Emphasis on these points is necessary (regardless of whether criticism is, in fact, justified) because on occasions, the uninformed refer to IMO in the context of being an independent or semi-independent organisation with a large staff of international civil servants making decisions on behalf of the maritime community. The reverse is the case. IMO has a relatively small but highly efficient staff of technical experts and secretarial support effectively led by the Secretary General, who respond rapidly to all decisions of the member countries. The response time is negligible compared with the time needed by the member countries to prepare their national legislation or for the maritime community to meet the regulations being promulgated. The secretariat provide the machinery through which the member countries operate. Their assistance includes providing position papers on topics to be discussed and explaining the issues and implications of alternative solutions, thus enabling delegates to make considered judgements.

Unfortunately judgements cannot always be made in ideal conditions. As discussed earlier, following a serious casualty, IMO is subjected to the same pressures as its individual member countries although there will inevitably be differences of opinion as to the response needed and its date of application.

The amendment procedures normally have less effect on the implementation date than the time taken to make considered judgements in formulating regulations within the committees and subcommittees before they are circulated on behalf of the committee to member governments prior to formal adoption.

In support of this contention, the instance of the *Amoco Cadiz* might be cited. Following the disaster in March 1978, the question of separate hydraulic circuits for steering gears was taken up by IMO as a matter of urgency. But immediate action was just not possible. Whereas improvements in the standards of conventions normally prescribe equipment and practices already available and in use in the ships of leading operators, no steering gears with independent hydraulic circuits were in service. Over 3.5 years of continual effort was required before regulations could be presented for adoption. The shipowners and manufactures then needed time to produce the hardware to meet the new requirements¹⁰ and consequently a period of 3 years was allowed before the entry into force date for new ships. To re-equip existing tankers to comply with the new requirements, a further 2 years was necessary. Certain tankers were afforded a further 2 years to meet the onerous 'single failure' criterion making a maximum time limit of 10.5 years.

It will thus be seen that the amendment procedures had virtually no effect on the overall timetable which, to those familiar with the subject, was necessary and appropriately arranged.

The speed at which IMO can respond was clearly demon-

strated in the case of the first amendments to the SOLAS Convention following the *Herald of Free Enterprise* disaster in March 1987. The UK proposals for amendments were submitted to IMO for detailed consideration by the subcommittees, but concurrently they were also made the subject of a formal submission to the Secretary General for circulation in accordance with Article VIII of the convention. In April 1988, the Maritime Safety Committee formally adopted the amendments and agreed unanimously that they should be deemed to have been accepted 1 year after the date of adoption and would enter into force after a further 6 months, ie in October 1989. The first implementation date for new ships was thus only 2.5 years after the casualty, as was the requirement for bridge warning lights on existing ships. The provision of television surveillance of the vehicle deck doors (or an equivalent provision) will be required after a further 3 years for existing ships.

To my knowledge, only in the response to the *Herald of Free Enterprise* disaster has a Member State submitted amendments for formal adoption, and only in that case has the accelerated amendment procedure been involved. The effect of the understanding, co-operation and goodwill of IMO will be evident from Table IV which compares the response times with those for the *Amoco Cadiz*. In my opinion, no other international body could have reacted so quickly.

The pressure of public opinion for action was understandable as 151 passengers were lost compared with 32 lives during the previous 20 years. But, if IMO is subjected to the same pressures for promulgation of legislation as its individual member countries are, the cynic might ask whether the collective approach through IMO is beneficial. The answer must be in the affirmative because only if a two-thirds majority of the parties to the convention are convinced of the need for the measures will the proposed amendment succeed. The Maritime Safety Committee is a moderating influence and insistence on an amendment which does not attract general support may lead to no change at all. On the other hand, if the required majority are convinced that the measures are reasonable, they will be applied by all countries to all ships and thus ensure a uniform standard of safety at sea.

The 'convention' system is equally advantageous in the case of new developments. At a recent conference, both a shipowner's and a shipbuilder's representative wanted to know whether the Port States would react unfavourably to large glass-enclosed spaces (atria) provided for the use of passengers. My advice was that they should ask their Flag State administration to put the matter to IMO in order that an internationally agreed decision could be made. A second recent example arose in relation to the use of polymers on board ships¹¹ when it was pointed out that a tanker operator might buy a tanker fitted with glass-reinforced plastic (GRP) piping only to find that it was not acceptable to his Flag State or to a Port State to which the tanker was intended to trade. Incidentally, this matter is currently under discussion at IMO within the general scope of the 'Use of Pipes other than Steel'. Many other advantages of the collective approach through consensus have been discussed within the body of the paper. The reduction in costs to administrations by the use of collectively developed regulations and IMO publications such as the IMDG Code is an obvious example of the benefit of shared effort.

Some of the advantages (and disadvantages if they are recognised as such) are given in Table V. Of these, the combined expertise and foresight of the technical experts within all countries is paramount. This expertise is not limited to that within governments since the views of all sides of industry are taken into account by the marine administrations

Table IV: Effect of formal amendment procedures on entry into force dates

	Time interval from date of casualty	
	Amoco Cadiz	Herald of Free Enterprise
Adoption of amendments by Maritime Safety Committee	3 y 8 m	1 y 1 m (Minimum period of 1 y 6 m)
Entry into force of amendments for new ships	6 y 6 m	2 y 7 m*
First entry into force for existing ship requirements	8 y 6 m	2 y 7 m*
Final entry into force for existing ship requirements	10 y 6 m	5 y 7 m
y =year(s); m = month(s). * It will be noted that the only effect of the formal amendment procedure was to possibly delay the entry into force of the first requirements contained in the <i>Herald of Free Enterprise</i> amendments asterisked above. Nevertheless, it must be recognised that some time is needed for administrations to consult with their industry, to develop domestic regulations, and for shipowners to fit the required equipment in their ships.		

Table V: Idealised advantages and disadvantages of conventions

Advantages
1. Equal degrees of safety for passengers and crews regardless of flag 2. Free movement within all ports if conventions' requirements are met 3. Ease of enforcement by Port States since inspections are to conventions' requirements which are known to surveyors 4. Greater expertise and experience available in formulating safety standards, regulations and procedures 5. Same standards apply to all ships, hence: a. predictable behaviour, eg collision regulations b. reduction in unfair competition c. economy in production – standard designs d. greater flexibility in ship transfer between different countries 6. Innovations, new designs of ships and equipment can be put to IMO for consideration and reactions of Member States to acceptance ascertained 7. Reduction in costs to individual Member States in producing: a. legislation b. codes of practice, eg IMDG code, novel craft code 8. Assurance of respect by ships of Flag States of: a. special areas for pollution prevention purposes b. traffic separation schemes 9. Facilitation of co-operation in, eg, search and rescue and arrangements for combatting pollution
Disadvantages
1. Convention requirements depend on consensus and must be followed 2. Pace of change of regulations is limited to convention's procedural arrangements and time scale 3. A two-thirds majority of parties to a convention is required for an amendment

of member governments prior to IMO meetings. In addition, non-government bodies having specialist expertise enjoy consultative status at IMO. All aspects of a case are thus taken into account before a decision is made. Political influences play no part in this work. There are as many differences of opinion between developed countries as there are between developed and developing. Each proposal for amendment is considered against the criterion of compelling need and there is considerable recognition of the problems of individual countries.

Collectively, IMO can react on a global basis in a manner which would otherwise be impossible. The organisation has not only responded to casualties by the production of appropriate safety and pollution prevention legislation on which worldwide agreement would not otherwise have been agreed (eg inert gas systems for oil tankers, fire protection arrangements for all types of ship and in the pollution field, segregated ballast tanks, crude oil washing together with oil monitoring equipment for oil tankers). It has foreseen potential hazards and acted to prevent or mitigate the effects of accidents in the cases of new types of vessels, eg chemical tankers and liquefied gas carriers. During recent years there has been a significant movement of ships from the traditional maritime countries with long established training and certification systems to countries without such traditions. In response, through its STCW Convention and global co-operation programme, IMO has taken major steps to ensure that seafarers are adequately trained to meet the demands of new technology. There is no doubt that during its 30 years of existence, the influence of the organisation has been immense. If its profile has been low, it is a measure of its success.

As a former seafarer and surveyor, I have been privileged to participate as a Government delegate in the work of IMO and, as a member of the Institute of Marine Engineers, to be involved in several of the conferences in which we have jointly participated in the interest of the seafaring profession.

REFERENCES

1. J Cowley, 'National administrations for safety and pollution prevention control', IMO Seminar on Survey and Certification, Tokyo, Japan (October 1980).
2. J Cowley, 'Marine safety and pollution-related problems of marine administrations', International Conference on Problems of the Developing Maritime World, Sharjah, *Trans IMarE(C)*, Vol 99, Conf 1, Paper H1 (1987).
3. J Cowley, 'Passenger ship legislation', IMAS 88, The Design and Development of Passenger Ships, *Trans IMarE(C)*, Vol 100 (May 1988).
4. J Cowley, 'Inert gas and fixed fire extinguishing systems', IMCO Seminar, Rio De Janeiro (January 1980).
5. J Cowley, 'Implementation by marine administrations of MARPOL 73/78', International Maritime Engineering Conference, IMarE/Bahrain Society of Engineers, Bahrain (1984).
6. J Cowley, 'General review of the new regulations covering safety and pollution', Joint RINA/IMarE Conference, *Trans IMarE(C)*, IBSNO 90096-85.3 (1978).
7. J Cowley, 'COW and its development, use and related aspects', IMCO Seminar, London (1978).
8. J Cowley, 'Design, construction and operations of oil

- Tankers; crude oil washing', IMCO Seminar, Rio De Janeiro (January 1980).
9. 'Global co-operation for the training of maritime personnel', Focus on IMO.
 10. J Cowley, 'Steering gear: New concepts and requirements', *Trans IMarE(TM)*, Vol 94, Paper 23 (1982).
 11. J Cowley, 'A marine administration's attitude to the use of polymers', Second International Conference on Polymers in a Marine Environment, *Trans IMarE(C)*, Vol 101, Conf 2 (October 1987).

Discussion

C P Srivastava (IMO) First of all, I would like to express my gratitude for your kindness in inviting me to be here today and to listen to Dr Cowley. I would like to say just a few words about what Dr Cowley has done for the International Maritime Organisation. Apart from the fact that he was leading the UK delegation to so many of our important inter-governmental bodies, Dr Cowley was also the Chairman of the Marine Environment Protection Committee. He was a member of the Board of Governors of the World Maritime University. He was also a member of a very select team which made an academic review of the World Maritime University. He helped the organisation and university on numerous occasions when we turned to him for advice.

I would like to recall in particular a request that I made to him after going to an important Member State with a large amount of tonnage but inadequate maritime administration at that time. All the dignitaries in that state told me that they were aware that a properly staffed and structured maritime administration needed to be established but they did not know how to do it. They asked for some help. When I came back, I approached the UK government and Dr Cowley very kindly advised them how to set up a maritime authority step-by-step. They were very pleased with his help. Many improvements have been effected there since, so we are indebted very much to Dr Cowley. I respect him for his very highly professional abilities and I respect him also for the fact that he is one of the finest gentlemen I have ever met. I am greatly beholden to him for what he has done in many different capacities.

The address today was very instructive, very informative and all I would wish to say is this: thank you very much, Dr Cowley, for explaining the dilemma which IMO constantly faces. I have been asked many times the same questions. Some people say IMO is doing far too much. There has been a proposal that there should be some sort of outside committee or group of wise people who should screen anything that comes to IMO, and advise on what IMO should or should not do.

On the other hand, there are other opinions that say IMO has not gone far enough. What is IMO to do in the circumstances? My question is: which is the body that can make a decision on this? My answer is: all states that are members of IMO constitute the best forum for such a decision. But decisions of this kind should be taken in consultation with the representatives of industry. Shipowners, seafarers, Classification Societies, insurance organisations, indeed every organisation which is global and has a maritime interest is represented in IMO. In IMO, Member States alone have the right to vote. But, and Dr Cowley would agree, we seldom vote on anything. The effort always is to reach consensus. Therefore, the right to vote is not a determining factor. What is important is the contribution. The industry makes its contribution and, I assure you, the industry is listened to with very great respect. Therefore, I think it will be fair to say that what IMO ultimately does is to develop a consensus. I hope you do not get the impression that consensus is at the lowest available basis. Far from it. There are differences of opinion, but generally the consensus is reached on what may be regarded as the highest practicable standard at any point of time. That is how these conventions and codes of practice have been developed.

Our biggest problem today is not so much the development of new standards. I think we have got a very good régime and there is a good procedure for amendments. Amendments are adopted, they enter into force, and things are going the right way in that direction. Our biggest problem is implementation;

how to ensure effective global implementation.

The problem that we face is lack of expertise in many parts of the world. It is a global problem and therefore our attention is now directed towards the development of expertise, the human resource element and training of personnel, and that is where IMO is doing quite a bit in the development of standards of training institutions. We are trying to assist them to develop proper curricula and syllabuses based on the STCW Convention and its recommendations; we have established the World Maritime University where students from over 100 countries have come and 400 have already graduated. They have gone back to 80 countries. They are occupying very important positions such as Director General of Shipping or general managers of ports or managers of shipping companies, surveyors for Classification Societies, and so on. Moreover, we are developing and implementing short, advanced, specialised courses. About 60 of them are being developed and they are being implemented at different points in the world.

This is the way we are going about it. The development of expertise in all parts of the world is not something that can be achieved overnight; it is a long-term endeavour, but the endeavour is well under way. It will have to go on for 10 or even 20 years. If we persist, as we must, we think we will have more expertise around the world progressively.

Our worry also is that sometimes it is felt that there is not enough attention given to the details of operational procedure on board ships. Sometimes, because inadequate attention is given to some detail or other, disasters happen. The question of proper management is not IMO's responsibility. It is the responsibility of shipowners and shipping companies, but some attention is being given to the general problem of overall management. Can we somehow generate more interest in the details of ship management? That sort of problem is also now receiving attention.

All in all, in my view, and I have been at IMO a long time now, all one can say is that IMO has moved ahead in a very pragmatic way, in full consultation with industry, to develop a well co-ordinated régime of conventions, protocols, codes of practice and so on, and it is now doing whatever a global body can do to encourage effective implementation by promoting maritime training according to global standards.

J Cowley [Britship (IOM) Ltd] I would like to thank Mr Srivastava for his kind words. I am grateful to him for opening the discussion.

As emphasised in the paper, the IMO secretariat do not make the decisions. They provide the machinery through which the member governments work together and, as head of the secretariat, the Secretary General has a most important role. It was inevitable that at IMO, as in any international forum, many strong and opposing views are held. Throughout the years, many situations had been reached where the possibility of agreement seemed remote, but Mr Srivastava's impartiality, understanding of the positions of the delegates, well-chosen words and appeals for the IMO spirit of compromise, had played a major part in the movement towards an agreement – even without vote.

Whilst Institute members are well aware of Mr Srivastava's standing in the maritime world, many may not know that he will be retiring as Secretary General later this year (1989) after 16 years of dedicated service to IMO during which he has held the confidence and respect of developed and developing countries alike.

From the Institute's viewpoint, he has been a good friend and admirer and IMO have participated with us in many conferences. Members will be pleased to learn that he has agreed that IMO will be associated, as a sponsor, with our 'IMAS 90 – Maritime Technology in the Environment' Conference.

We do, of course, hope to be seeing Mr Srivastava again both before and after his retirement but on our behalf, I would like to thank him for his contribution to maritime safety and his goodwill towards the Institute.

G Victory (Retired) In Dr Cowley's excellent paper he says: 'The uninformed consider IMO to be an independent or semi-independent organisation with a large staff making decisions on behalf of the maritime community', and that 'approbation or criticism of its actions should be directed at the member countries'. Perhaps he should have introduced the paper with these comments, for until everyone working in the marine field appreciates the IMO *modus operandi* – and many do not – then they cannot begin to appreciate the operations and ramifications of that body so well presented in this paper.

The fact that IMO is the only United Nations Agency with headquarters situated in the UK, is in itself a tribute to the esteem in which this country is held as is the history of the UK as leaders in marine safety. But IMO has no direct mandatory powers; they are left to the participating nations. To get so large a number of nations, of different cultures and having different opinions on the value of human life, to agree on any safety regulations is also a great tribute to IMO. Only by having international agreement on the fundamentals, by having internationally agreed regulations, although unfortunately perhaps not to the same level of international enforcement, can the safety of seafarers be improved and shipowners in the more developed countries be protected against those who would accept lower or any standards. Perhaps the enforcement level varies too much, with some countries without proper survey staff of their own – and there are many of these – willing to delegate the task of enforcement and surveys to any Classification Society, private surveyor or individual who will do the job on their behalf without worrying how well or how badly the job is done. This problem is now being addressed at IMO and we wish them well. Despite all these difficulties they do a good job with less political in-fighting than most international rule-making bodies.

It is obvious, as Dr Cowley comments, that a paper of this length could not adequately cover every aspect of the relationship between IMO and national administrations, but this very fact may unintentionally do IMO an injustice and lead to the misconception in the mind of the reader that IMO is ponderous and slow and takes many years to get badly needed improvements onto ships at sea. Such is far from the case!

Unfortunately, Table I of the paper tends to give the impression that the actual drafting of rules was done at SOLAS conventions prior to 1978 and the dates of their entry into force were the point in time when the various safety requirements would be provided aboard ships. Had this been so then IMO would indeed have been a white elephant. Fortunately it was not!

Perhaps this could be clarified if Dr Cowley would give a 'family tree' of the IMO structure with its committees and subcommittees identified. For in practice problems identified by national administrations are submitted to IMO and passed down to various committees and subcommittees – the Maritime Safety Committee and its Ship Design and Equipment, Fire Protection and Safety of Navigation Subcommittees are typical – and it is in their meetings and sometimes those of *ad*

hoc groups formed to study a problem that the work of studying the best solutions and of drafting proposed regulations as amendments to SOLAS take place. This fortunately reduces the number of countries in the drafting groups to a more manageable level and concentrates the available expertise. However it also means that as agreement has to be reached among a number of possible conflicting interests – sometimes with a number of operationally interested parties attending as observers – the resulting drafts tend to be the best which can be agreed – a sort of 'lowest common denominator', and not the optimum.

Sometimes a delegation has to propose a regulation to produce a level of safety on which they think they can get agreement, for if they go for the optimum solution they may end up with nothing at all! So IMO requirements tend to be 'minimum' requirements, but this is often forgotten. Some regulations often carry the comment 'in certain cases it may be necessary to provide additional safeguards'. But it is most unusual for any requirements over and above those of IMO to be asked for. A case in point is the ventilation of car decks in ferries, where, although the atmosphere is often intolerable and would not be permitted in shore employment, the IMO minimum number of air changes are provided and the provision that extra ventilation may in some cases be required, as is laid down in SOLAS, is ignored. These two facets of IMO might perhaps be mentioned in the list of disadvantages given in the paper.

The number of amendments quoted as being adopted between 1966 and 1973 (Table I) is an indication of the intense pressure on the subcommittees due to the flurry of developments in ships in the 1960s and early 1970s and the urgent need to amend the 1960 SOLAS which differed little from SOLAS 1948 and was mainly convened to get an agreed document deposited with IMCO, as it was then. The work included the need to update the regulations for passenger ships – particularly in respect of fire protection, subsequent to a number of fires off the American coast – and the need to provide reasonable safety on the new types of vessels which were being developed, often before rules had been formulated to cover them. Bulk carriers, gas carriers, bulk dangerous-goods carriers, together with the escalation in the size of tankers to 500 000 tons, all needed to be covered as the rules for ordinary general cargo ships could not be applied to them.

More and more passenger car ferries were being built without the main vertical zoning required in traditional passenger ships and an effort had to be made to produce regulations which would give them the 'equivalent level of safety' required under SOLAS 1960. I am afraid that recent events show that this was not achieved, either in respect of stability in damage conditions or in the level of fire safety provided for passengers when waiting in their cars to go ashore! Where it was not possible to make hard and fast rules for newly conceived types of ship the subcommittees produced codes of practice for 'novel craft' – hydrofoils, hovercraft and other high speed vessels, and for 'nuclear ships', for we were nearer to having nuclear merchant ships in 1974 than at any time since! In addition a great deal of work was done on regulations governing marine pollution in preparation for MARPOL 73. All these amendments went into the 1973 MARPOL or the 1974 SOLAS, often almost word-for-word as drafted on Thursday nights in preparation for a subcommittee approval on Friday!

Although these amendments had to await a convention for formal adoption this does not mean that they just laid on the shelf without anyone doing anything about them – a fact which Dr Cowley does not mention.

These amendments, which covered almost all aspects of marine safety and pollution, were circulated to all contracting

governments who were invited to adopt them at the earliest possible date. Many countries put them into effect by incorporating them in national legislation without awaiting a convention. In addition, no company ordering a new ship could afford to ignore draft regulations which they knew would be adopted and enter into force whilst the ship was still comparatively new, for they could be quoted in an enquiry as 'good practice' in the event of a casualty!

Hence practically all new passenger ships and car ferries built after 1970 complied with the 1969 amendments (Part H) and most new VLCCs were fitted for and practiced the 'load on top' technique, developed as a joint exercise by industry and the DTI some time before it was presented to IMCO, whilst changes in steering gear designs consequent on the findings of the *Amoco Cadiz* formal enquiry were being incorporated into new designs by steering gear manufacturers before being adopted at IMO. Unfortunately when IMO did consider the faults in the *Amoco Cadiz* steering gear, as presented in the enquiry report, they must have worn blinkers for they concentrated on the major fault leading to the failure whilst ignoring five other faults in that design which contributed to the engineer's inability to correct the situation, and which for all we know may still be incorporated in the new designs. These include inadequate-sized relief valves, inadequate filling and purging lines, and a changeover arrangement (bridge to local control) which could not be carried out in rough weather! Worse still there was the unforgivable sin of not providing a relief valve system directly between the two ram chambers. The danger of bursting these prevented the isolating valves on the ram cylinders, which would have cushioned the tiller motion at an early stage, being shut off.

Two cases mentioned by Dr Cowley are unfortunately not correctly portrayed in the paper. These are in respect of the *Maetra*, *Marpessa* and *Kong Haakon* explosions and the *Herald of Free Enterprise* tragedy.

Dr Cowley dismisses the *Maetra*, *Marpessa* and *Kong Haakon* explosions with the comment that 'the exact cause could not be determined'. Then he says IMO was asked to take up the question and, 'The organisation responded with the requirement for inert gas systems – and the engine outlook for the safety of tankers changed'. This is giving the midwife credit for the birth of a child when everyone know that the real work was done some time before that!

The fact is that the DTI mounted a Court of Formal Investigation into the *Maetra* case with the intention of obtaining a court recommendation that future new VLCCs under British registry should be fitted with inert gas systems and that existing ones should be fitted as soon as practicable. With such a recommendation, and to avoid British owners being penalised *vis-à-vis* foreign owners, the UK would go to IMCO and request that this should be the subject of an amendment to SOLAS. The court, headed by the Hon Justice (now Lord) Henry Brandon, MC, sat for 47 days and concluded that no known tank washing system being operated could guarantee a non-explosive atmosphere during and after tank cleaning, and recommended: 'As regards VLCCs (cargo compartments of over 100 000 m³ capacity):

1. the inert gas system should be fitted to all new ships during construction.
2. the inert gas system should be back-fitted progressively to existing ships, subject to the capacity of the shipbuilding and repairing industry.'

Even before the court had concluded its sittings on 23rd March 1972 the major tanker owners went home and ordered inert gas systems for all new VLCCs. So although some older tankers did not refit for a number of years, in most cases this

major improvement did not have to wait for the UK to take the proposals to IMCO – which it did – or for that body to go through its study and consideration of the amendment, much less await its coming into force!

Referring to the *Herald of Free Enterprise* disaster, Dr Cowley stresses the rapidity with which the UK proposals were submitted to IMO and the speed with which they will, hopefully, enter into force. This does not take account of the fact that the amendments to date have been purely cosmetic and have, in no way, corrected the fundamental fault in the design of such vessels, ie the lack of vertical zone bulkheads on which the survivability, stability and fire protection of traditional passenger ships depend. It is obvious that more amendments will be required before the 'equivalent safety' required under SOLAS 1974 is achieved. We know that more work is going on and it is hoped that the problems of stability and survival in damage condition on these ships, where water entering the car deck can flood a deck from end to end, will be overcome, but it is obvious that more amendments must be formulated at IMO before the matter can be laid to rest!

The regulations for these ships were introduced 20 years ago (1969) and were the best which could be agreed at that time for the ships which were being operated in increasing numbers. But over the years the ships have changed and, perhaps more importantly, the operational procedures have changes out of all recognition in the race to get a 'quick turn-round' at any cost! Operational procedures were allowed to take precedence over safety. The cost in the case of the *Herald of Free Enterprise* was 151 passengers and some 40 crews lives! It seems that nothing done at IMO has removed the chance of a similar result arising from a collision. In my opinion the solution will need to involve the provision of double-shell hulls, sponsons, or some form of portable sliding bulkheads, where main zone bulkheads would otherwise be positioned. For drainage, large diameter scuppers should drain water from the car decks directly to an empty double bottom tank with connections to the main discharge pumps. Some presently accepted arrangements are hopelessly inadequate but when I suggested this some 20 years ago I was informed that these improved drainage arrangements were not permissible under the tonnage laws. Let us hope that such archaic laws will not be allowed to stand in the way of improved safety again!

Whilst the subject of car ferry safety is on the agenda it is hoped that IMO will consider the effectiveness of the fire protection provided in the car spaces.

It is now apparently the practice to permit these vessels to move across harbour, and even to sea, with the main doors open, and to allow drivers to enter and start cars and vehicles, which are now parked nose-to-tail with scarcely room to get between them, before the vessel has docked and the car doors have been opened. Such operations were unthinkable when the regulations were drafted. With the *Princess Victoria* tragedy very much in mind we would have required the fitting of alarms and possibly an engine interlock to avoid such a happening had we thought that anyone could be so negligent as to move the ship with the doors open. This is not safe even across the harbour – for I have seen 6 foot waves, enough to enter a car space, in Dover harbour. We put a bridge alarm in the SOLAS 74 regulations to indicate when the doors from accommodation to the car spaces were opened, which is much less dangerous, so we would not have contemplated operations with the main doors open! Changes in design apparently mean that some ferries have to open the doors before berthing and to move from the berth before the doors can be closed. This raises the question as to whether this should have been allowed.

The problems of providing adequate protection for passen-

gers from fire, also arise from the change in operational practices – in the event of a petrol fire, perhaps from starting an engine in gear or with a flooded carburettor, whilst passengers are in their vehicles awaiting berthing, there is nothing to stop the fire running the whole length of the car deck. The problem has not been helped by the larger ferries carrying more cars and the adoption of half-height portable side decks from which escape would be very difficult. The fire protection for the space depends on a water spray system which may well be unable to control a running petrol fire, for the fire would be protected from the ‘knock down’ effect of the water spray by the closely parked vehicles. This is another area where the removal of the ‘main zone bulkheads’, which provided effective ‘A-60’ fire protection between zones, has not been adequately or equivalently compensated for! Before the 1969 amendments which the UK were bound to accept, and which were not unrealistic in 1969, the UK and some other countries had a better system than that now provided. In order to get the necessary exemptions a clear space had to be maintained between white lines across the decks where bulkheads would otherwise have been and this area was covered by a water curtain having twice the general rate of water application. This clear area into which no vehicles were allowed, allows the ‘knock down’ effect of the water curtain to be used to advantage. Tests in the UK showed that a clear space was necessary to control a running fire, but in the event our arrangement was voted out at IMCO in favour of the current system, which was said to have been tested in Denmark. To the best of my knowledge this system has never been subjected to realistic tests; in the UK certainly not under present operating conditions and with interposed vehicles. Perhaps the Fire Research Station at Borehamwood should be asked to test its efficiency or otherwise in the event of a fire with passengers in their cars, for in the event of a fire it could well be that few would get out alive! Can we afford to take that chance? It seems that there is much to be done before the car ferry problems are behind us for even in the case of ‘the provision of television surveillance of the vehicle deck doors’ already adopted (as mentioned in the paper), Dr Cowley informs us that a further 3 years will elapse before this is required for existing ships.

This is not necessarily a criticism of IMO but a reflection of the complexity of the problem, for without IMO where would we be? We can only wish similar success in the future and more power to their elbow!

If some of these comments appear to be critical of IMO and its work, I would only say that, having been ‘a toiler at the vineyard’ for 10 years, I emphatically support the efforts which have been, and are being, made in the various activities which result in improvements in the safety for passengers, crew and ships under the regulations which emanate from that organisation! There are many varied interests and many opinions as to the value of human life in different parts of the world, so it is difficult sometimes to get agreement as to how far improvements should go, yet delegates remain friendly and IMO staff are helpful and hard working.

It is unrealistic to scrap relatively new ships because they do not comply with amended regulations, so it takes time to ensure that all ships comply. But changes which have been shown to be necessary are made to new ships at an early date – much earlier than Dr Cowley’s Tables would indicate. As a final thought – if we did not have IMO what would be have? The mind boggles!

After all, if next year’s ships are safer than last year’s then IMO and those participating in IMO activities have done their job!

J Cowley [Britship (IOM) Ltd] I have noted Mr Victory’s interesting and extensive comments on a wide range of topics, many of which fall outside the scope of the paper. The objective of the paper was to deal with the relationship between national administrations and IMO, rather than to expound in detail on specific subjects which have been covered in specialist papers, eg refs 1–8, 10 and 11 of the paper.

One aim of the paper was to show that today IMO was not ‘ponderous and slow’ by demonstrating the tremendous increase in speed with which amendments were now being brought into force (Tables I and V of the paper). Industry now has difficulty in keeping up and coping with the requirements following the changes introduced in the procedural arrangements. Mr Victory has, in particular, commented that the inclusion of the word ‘never’ in the final column of Table I gives the impression that the proposed amendments to the 1960 convention never entered into force. However, it will be noted that the next line of Table I makes it clear that they were incorporated into the 1974 SOLAS Convention and entered into force in 1980 (ie 14 years after the 1966 amendments). The intention of Table I was to illustrate the extreme difficulty in getting sufficient ratifications to bring amendments into force using the explicit amendment procedure as the number of member countries increased. The point being made was that the measures never entered into force as amendments to the 1960 convention. The Table does, as intended, demonstrate clearly that despite the rapid increase in the number of member countries of IMO (now 133), the introduction of the tacit amendment procedure resulted in a much faster implementation of agreed measures.

It took 19 years before the measures agreed in the first SOLAS Conference (1914) came into force in 1933. On the other hand, using the tacit amendment procedure, the 1981 amendments entered into force in 1984; the 1983 amendments in 1986; and the April 1988 amendments will enter into force in October 1989. The basic difference in principle between the two procedures is that the explicit procedure requires a defined number of administrations to ratify the agreed measures (ie to take positive administrative actions) whilst under the tacit amendment procedure, the agreed measures automatically enter into force at a pre-determined date unless, *inter alia*, at least one-third of the contracting governments object in writing to the proposals adopted by two-thirds of the contracting governments. Incidentally, this procedure also has the advantage that the amendments enter into force on an agreed date and preparations for compliance can be planned.

With respect to unratified amendments, unfortunately Mr Victory is not quite correct in saying that ‘no company ordering a new ship could afford to ignore draft regulations’. The fact that many did, meant that great difficulties were caused when foreign owners wished to ‘flag into’ the UK register foreign ships which complied with the full international requirements. These difficulties arose because the Department implemented the IMO draft regulations for UK ships before they entered into force internationally. If all shipowners and all countries were ready to comply with the draft regulations, then the ratifications would have been forthcoming much more rapidly.

With respect to inert gas systems, it was not the intention to establish, using Mr Victory’s analogy, where the credit (or otherwise) for the birth of a baby should lie. If IMO is to be cast as a midwife, then its regulations would be the baby rather than its conception. Nobody would claim other than that all the basic work behind all the conventions’ requirements is completed outside of the IMO committees. As Mr Victory rightly says, ‘the real work was done some time before’ the regulations were

written and 'everybody knows that' so there was not much point in stating that fact (which applies to all the regulations in SOLAS). Of the advantages of the convention system, the paper clearly states 'of these, the combined expertise and foresight of the technical experts within all countries is paramount', and the purpose, *inter alia*, of IMO is 'to provide the machinery for co-operation amongst governments and . . . to encourage the general adoption of the highest practicable standards in matters concerning maritime safety . . .'. IMO is certainly not, in any sense, a research organisation and it is hoped that the paper does not give that impression.

As Mr Victory may be aware, the UK implemented the requirements for inert gas systems down to 20 000 dwt tankers for both UK and foreign ships prior to the entry into force internationally of the SOLAS protocol although not all the tankers on its register were fitted with such systems.

Regarding the work of the subcommittees, referred to by Mr Victory, all details concerning IMO could not reasonably be expected to be included in the paper and there must, necessarily be other facts not mentioned in the paper. Where applicable, within the intended coverage, subcommittees are mentioned in relation to particular points being made, eg on the fifth page, reference is made to the 'normal result of a CDG subcommittee meeting being 400-500 replacement pages of amendments to the IMDG code'.

I welcome Mr Victory's proposal to include information on the IMO technical structure and work of the subcommittees. Their inclusion had been given deep consideration but was decided against because the paper was not primarily concerned with the work of the committees (which could be the subject of a paper), and the paper was already at the permissible limit.

Fig 1 below shows the 'technical' structure of IMO but it cannot show the important consultative bodies representing Classification Societies, shipowners, seafarers, environmentalists and a wide range of industries who make a tremendous contribution to the work of the organisation (see, eg, Mr Srivastava's comments). Reference to this combined expertise is, of course, made in the paper in connection with the advantages of IMO conventions (Table V).

An illustration of the minimum time taken for a proposal to progress through the subcommittee(s) is shown in Table I below. The time may, however, be much greater, especially if the subject needs the expertise of more than one subcommittee. Often a 'lead' subcommittee is nominated by the Maritime Safety Committee.

Mr Victory mentions five faults in the *Amoco Cadiz* steering gear which he obviously feels are not specifically included in the upgraded IMO regulations. Whilst these detailed points would be more applicable to a specialist paper (eg ref 10 of the paper), in view of Mr Victory's implied criticism, it is appropriate to review the background to the regulations especially as it will illustrate some of the general assertions made in the paper.

In brief, the 1929 and 1948 SOLAS conventions contained no requirements for steering gears. The 1960 convention introduced minimal requirements which were repeated without alteration in the 1974 convention. These minimal requirements specified a main and auxiliary steering gear. However, 'Where the main steering gear power units and their connections are fitted in duplicate to the satisfaction of the administration, no auxiliary steering gear need be required'. In short, a two-ram steering gear with two pumps would meet the

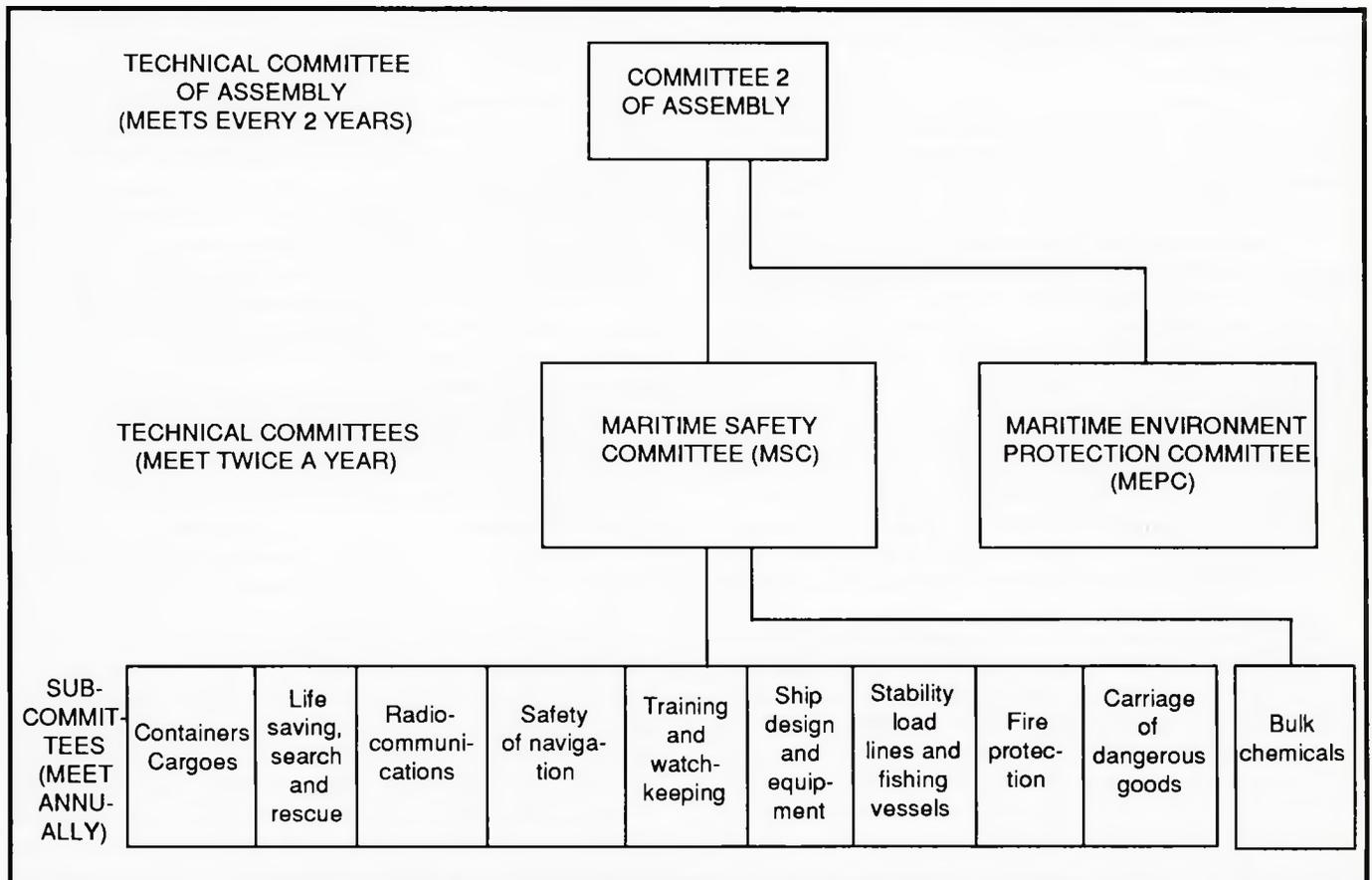


Fig 1: IMO technical committees and sub-committees

Table 1: Example of progression of a problem through IMO subcommittees meeting at 12 monthly intervals

Body	Activity	Time interval (months)
MSC	Approval of a problem and allocation to subcommittee.	6
Subcommittee	Consideration of a problem allocated by MSC, making a programme, call for papers.	12
Subcommittee	Consideration of first submissions and developing first form of document, which is circulated to all members and other subcommittees.	12
Subcommittee	Working group established to consider all the recent submissions and a final draft is developed.	12
Subcommittee	Final submissions are considered and a new draft is prepared for submission to the MSC.	6
Expanded MSC	Final document is considered and approved.	Total: 50

regulations. This situation applied until the 1978 SOLAS protocol entered into force in May 1981. The additional requirements included in the protocol in February 1978 were taken directly from the recommendations included in the IMO resolution A325 which had been developed over several prior years in an evolutionary manner (ie not in haste following a serious casualty).

Any delegation which felt strongly about 'the five other faults in the design' should surely have submitted them to IMO in order that they could be put to the group for inclusion in the recommendations of A325 – especially as it is always easier to get such points into resolutions (recommendations) than regulations. They would then have been included in the protocol along with the rest of the resolution A325 recommendations.

At the risk of venturing off the subject of the paper, it is less than fair to say that, 'they must have worn blinkers for they concentrated on the major fault leading to the failure'. Whilst it is surely right that the delegations should concentrate on the major fault, it must be mentioned that regulation 29 (steering gear) is now 6-times more extensive and much more onerous than SOLAS 74 which was in force at the time of its protocol of 1978. With respect to the points he raised, Mr Victory's attention is directed to new regulations: 29.2.3 (relief valves); new regulation 29.12 (hydraulic fluid and recharging); and 29.7, 29.8 and 29.10 (control and steering from a local position aft).

Mr Victory was, of course, correct to say that steering gear manufacturers were incorporating changes in design before the requirements were adopted by IMO. This must inevitably be the case with any new regulation – there would be no point in adopting a requirement which could not be met. Following the *Amoco Cadiz* casualty, there was extensive co-operation between manufacturers and administrations in many countries. Nevertheless, a long period of time was necessary to enable the industries to prepare before the requirements entered into force.

Mr Victory's comments on *ad hoc* working groups are

interesting, especially with respect to the comment, 'resulting drafts tend to be the best that can be agreed – a sort of lowest common denominator – and not the optimum'. It seems to me that each participant will feel that his preferred solution is the optimum. IMO's regulations are minimum requirements and it has been the policy of many traditional maritime countries over recent years to work to these requirements unless there has been some compelling reason (eg a major casualty) for not doing so. This follows the continual inclusion in IMO conventions of their national regulations.

I could not agree with some of Mr Victory's points on car deck ventilation. The UK and IMO requirements are both for 10 air changes/h but more may be required during start up of vehicles. This standard was accepted for 'shore employment' since dock workers were employed in such spaces and the Marine Directorate had worked very closely with the Health and Safety Executive in this area. Research projects had been conducted

and were continuing and the topic was being worked on within IMO. Initial UK tests conducted in 1981 indicated that air pollution levels were within accepted limits. Later tests concluded that problems existed in some ferries due to premature start up of diesel engines and failure of drivers to comply with the instructions of ships' staff.

With respect to damage stability conditions for passenger car ferries (and other passenger ships), Mr Victory's attention is directed to the exceptionally onerous standards adopted in November 1988 (entry into force date 29th October 1990).

Several traditional maritime countries' experts believed they were almost too difficult to achieve. However, as Mr Victory is aware, there is a limit to the damage any ship can withstand (ref 3 of the paper). Once that damage is exceeded the behaviour of the ship is not predictable. Many hundreds of lives have been lost in ship collisions not involving ro-ro vessels, even in recent years. (All forms of transport are potentially dangerous.) The new standards will take into account wind forces and heeling moments due to the movement of passengers evacuating the vessel. For damage below the prescribed level, water should not reach the bulkhead deck and for damage above that prescribed in the regulations, the probability will be reduced for all types of ship. However, in the latter case, if water gets on the car deck there is a possibility of rapid capsizing unless some additional measures can be produced which will still preserve the ro-ro concept.

The Department had a major research project under way and it would be interesting to see whether any practicable solutions to the problem could be produced. Mr Victory's suggestion for double shells was one of the arrangements under consideration but a collision breaching both shells is a possibility and it must be accepted that no drainage arrangements to double bottoms (as also suggested by Mr Victory) could cope with the amount of water which entered the car deck of the *Herald of Free Enterprise*.

I could not accept that the UK proposals to IMO were 'purely cosmetic' or that 'they will, hopefully, enter into force'.

They will enter into force internationally in accordance with Table IV of the paper (tacit amendment procedure) for both new and existing ships, ie indicator lights on the bridge showing that the vehicle deck doors are both closed and bolted or otherwise will be required from October this year (1989), as will TV cameras for new ships. Many professionals believe that the provision of TV cameras in addition to indicator lights is unnecessary whilst others, like Mr Victory, would only have required the 'fitting of alarms . . . had we thought that anybody could be so negligent'.

I could not, however, agree with the suggestion of an engine interlock which would prevent operation if a door were open since a fault in the circuitry could lead to loss of engine power during a crucial manoeuvre in the congested areas around the Channel ports. With respect to alarms, Mr Victory stated that, 'We put a bridge alarm in the SOLAS 74 regulations to indicate when the doors from accommodation to the car spaces were opened', but I could find no trace of that requirement.

The third requirement in the initial UK submission to IMO was for supplementary emergency lighting in public spaces and alleyways which would operate independently of the main and emergency sources of electrical power which are only required to operate up to 22.5 deg list. These constantly charged emergency accumulator units are required to operate for at least 3 h at angles of up to 90 deg of list, but the advantage of such units is their complete independence in the event of fire, flooding and electrical failures. It was these latter advantages which led to their acceptance rather than their ability to operate at up to 90 deg of list.

The door indicators and TV cameras have been in force even for existing passenger ferries since January 1988 for UK ships (March 1988 for foreign ships in UK ports), and the emergency lighting units since July 1988 for UK and foreign ships in UK ports. With this explanation, it is hoped that the reader will accept that these requirements are in no sense 'cosmetic'. They were, as stated in the paper, submitted directly to IMO as prepared amendments to the convention and, in parallel, to the subcommittees where the majority felt that much of their content was too onerous. In view of the urgency, they were dealt with in a working group at the Maritime Safety Committee and in plenary. A good spirit prevailed and an acceptable package containing the essence of all the UK proposals resulted.

This lapse into details has been useful to the general theme of this paper since it illustrated how a 'good' IMO member country may understandably, in the face of public concern, be forced to act rapidly and take unilateral action against foreign ships. The disadvantage of, even temporarily, contravening the convention principle of free passage to all ships which meet international regulations was well understood. The decisions were not taken lightly and the Secretary of State himself addressed the 15th Session of the Assembly on the political and policy aspects of the situation facing the UK.

It is much more difficult for citizens of developed countries to understand why IMO takes, for example, 'a further 3 years' for the provision of TV cameras (even the 'responsible' press quoted this period although they were well briefed that this would be an immediate requirement for new ferries and that indicator lights would be required 3 years earlier for existing ferries). Closed-circuit TV is, of course, a common feature of everyday life in such countries and it does not constitute an unbearable installation cost to a North-west European country. But it is a major burden to a developing country without foreign currency reserves to import, fit and maintain such a system. Developing countries with low cost personnel, have very different priorities and it is really remarkable that so much

agreement across the whole field of maritime safety has been achieved at IMO. As Mr Victory very rightly concludes, 'If we did not have IMO, what would we have? The mind boggles'.

M Brulez (BV) This paper is a very accurate and complete review of the duties of an administration and will be, in the future, a useful reference document.

My main remarks concern the section 'Nominated surveyors and recognised organisations' in the paper.

As a Classification Society surveyor, I appreciate that Dr Cowley has mentioned the problems resulting from 'duty to both the administration and the shipowner'. It is not always easy to make the young surveyors understand the difference and this point can never be over-emphasised. Bureau Veritas' internal instructions to surveyors stress this point and the subject was discussed in 1988 in all national committee meetings.

Concerning the societies to which the administration may grant delegations, I would prefer to see IACS membership mentioned as a general condition. However, I recognise that, in some countries, the administrations need to use the local national society even if it is not up to the standards of an international society such as a member of IACS.

We at Bureau Veritas support the concept of a written agreement between the administration and the recognised Classification Society; preferably a unique document signed by all recognised societies. However, such documents should avoid the following two pitfalls.

1. They should not contain too many details.
2. In particular they should not contain too many arrangements specific to the administration concerned.

Most large international societies enjoy the recognition of over 100 administrations. Whatever the quality of the organisation, the communication system or the qualification of its surveyors, compiling, distributing, knowing and applying more than 100 different families of instructions, stretches human capability to an extreme. The consequence is numerous mistakes, generally of minor importance, but which may, in some cases, appear to the outsider as a sloppy operation. This is to be avoided with the use of simple, clear and if possible standard agreements.

D W Smith (BV) The author refers in his paper to the responsibility of an administration to guarantee the completeness and efficiency of its inspection and survey. When discussing the delegation of survey work, by flag administrations to Classification Societies, he indicates the need for a flag administration seeking to meet this responsibility to maintain some presence on board. When he states that the retention by the administration of SEC and MAS surveys gives the administration an annual presence on board, he no doubt had in mind the normal working practice applied to UK-registered cargo ships.

Later, the author is kind enough to state that the major Classification Societies have established resources far in excess of those available to the marine administrations and explains that it is as a consequence of this that the administrations have generally delegated the load line and safety construction work to the Classification Societies. Yet this practice is not followed in the UK in the case of passenger vessels where the survey of main and auxiliary machinery items covered by the vessel's classification certificates are re-surveyed by the Department of Transport or surveyed in parallel with the Classification Society surveyor. It would seem a more efficient use of flag administrations' manpower – and it is notable that in many administrations the available manpower is not as great as they themselves desire – if the administration were to

concentrate more specifically on life-saving appliances, fire-fighting equipment and similar emergency equipment, and simply monitor the more traditional classification work.

The author's remarks on the training needs of the less traditional maritime nations are noted and the progress made in this direction through the auspices of IMO is to be commended, but does the author not agree that there are now urgent training needs in some of the more traditional maritime nations? Does he foresee the day in the not-too-distant future when Western European administration and classification survey stations will be compelled to turn to these emerging maritime nations to find surveyors with that element of sea-going experience so essential in the competent ship and engine surveyor?

Finally, I would like to congratulate IMO for the way in which it has managed to achieve a greater degree of standardisation throughout the international marine industry. As a surveyor directly involved in the application of the various IMO conventions I must admit that I have in the last few years been, at times, overwhelmed by the volume of change placed into effect but, without the extent of international standardisation effected, a difficult job would have become an impossible one.

J Cowley [Britship (IOM) Ltd] I would like to thank Mr Smith for his kind remarks about the paper. Whilst I am not in a position to speak for the UK administration, I would like to comment in a general way on the pertinent points raised by Mr Smith.

A traditional seafaring country with a relatively large number of ports has certain priorities including: the maintenance of a surveyor presence in each port; a need to respond to public opinion; and a background of expertise within its survey force (see, eg, ref 2 of the paper).

Concentration only on safety equipment work would rapidly lead to a lack of expertise in other functions and an inability to meaningfully conduct casualty investigations or represent its industries at IMO. Having an establishment of surveyors sufficient to maintain a presence in its main ports, it would be difficult to explain to its public why those surveyors had not been involved in the survey of a passenger ship which suffered a major casualty. In the case, for example, of the *Herald of Free Enterprise*, the Department's surveyors were called to give evidence both in the public interest and in defence of the Department's policies. It may not have been acceptable to say that the Department was not involved because it would be a more efficient use of resources to delegate everything to the society except safety equipment. Mr Smith is certainly not the first person to make such a suggestion and this might eventually be the decision. As Mr Smith is aware, such decisions are not made by professionals and it has already happened in the case of one of the registers of a traditional maritime country that the societies do all statutory surveys. This is also the case in many countries with only one or two main ports, and open register countries.

With regard to training of ships' personnel, I agree that there are now urgent training needs in some of the more traditional maritime nations. The problems are, however, somewhat different from those of the developing countries where there is a dearth of training establishments and qualified lecturers but no shortage of potential seafarers (as opposed to qualified and experienced seafarers and former seafarers). The opposite is the case in the developed countries. For example, there are still enough training establishments and qualified personnel but there is a shortage of potential officers. In my opinion, the traditional maritime excellence could well move eastwards and be the sources of marine surveyors for the developed countries' governments and Classification Societies.

J R G Smith (LR) Firstly, may I congratulate the author on yet another excellent paper. It is a remarkably cogent description of how convention regulations are produced and applied.

My attention is initially drawn to the mention of Classification Societies and I would like to expand a little on this. In the paper the author states that the problems for administrations lie not in deciding whether to delegate but in deciding what to delegate. He then goes on to say that as a consequence of dealing with the structural strength of ships for classification purposes, it is the custom for the major part of the Load Line and Cargo Ship Safety Construction Certificate work to be delegated to the Societies. I feel bound to add a little to this, by pointing out that structural design appraisal and associated surveys involves very high technology work, in which I would suggest modestly, the major Classification Societies are unsurpassed in the world. They are therefore very well technically equipped to deal with the remaining statutory requirements.

Why should it be then, as the author goes on to say, that administrations which delegate all statutory functions have casualty rates above the world average, unless special measures are taken? The author rightly suggests one reason as being the societies' lack of statutory rights to board a ship at will. Consequently the ship is only seen during actual surveys, and since these can be up to 18 months apart (if surveys are requested 3 months before the due date in one year, and 3 months after the due date in the next), anything can happen in between, especially items of equipment can be lost. This problem is eased somewhat by Port State control inspections between due surveys (which are welcomed certainly by Lloyd's Register), and which in the main tend to expose lack of adequate maintenance as well as, admittedly, the occasional survey lapse, and, as Mr Srivastava has mentioned, the need for worldwide implementation and uniformity. General inspections by the administration surveyors or inspectors, in addition to the statutory surveys carried out by the Classification Societies, are also a good backup. I believe this is the primary function of the 400 (approx) inspectors employed by one administration, as mentioned by the author in his paper. I wonder if the author could kindly confirm this?

Finally, I would like to draw attention to some Port State requirements that are in addition to those of the Flag State. What I have in mind, for example, is the line taken by the US Coast Guard in their treatment of foreign passenger ships entering US ports. Application of the SOLAS Convention by or on behalf of the Flag State is not enough in some cases, and such ships are sometimes subjected to additional requirements by the Coast Guard to satisfy their own SOLAS interpretations. It is recognised that the Coast Guard have a heavy responsibility to the large numbers of US passengers carried on these ships, but it must be said that their approach does cause some problems.

Furthermore, an example of US requirements, that are in addition to those of an internationally agreed convention, is their requirement that all existing foreign flag oil tankers between 20 000 and 40 000 tons deadweight calling at US ports are to have segregated ballast tanks, or dedicated clean ballast tanks, or crude oil washing systems, by the 1st January 1986, or by the time they are 15 years old, whichever is the later. Existing tankers in this deadweight range are exempt from these requirements under Annex I of MARPOL 73/78, but the US appear to have applied unilaterally Resolution 4 of the International Conference on Tanker Safety and Pollution Prevention, 1978.

I would very much appreciate Dr Cowley's views on this matter of requirements imposed by a Port State that are in addition to the convention requirements imposed by the Flag State.

J Cowley [Britship (IOM) Ltd] I would like to thank Mr Smith for his kind comments. Concerning structural design and the resources of the major societies, the paper was intended to convey exactly the sentiments expressed modestly by Mr Smith and I agree that they were very well technically equipped to deal with the remaining statutory requirements. I also agree that general inspection by an administration's surveyors is a good backup but these could be combined with an SEC or MAS with a beneficial return on surveyor resources to the administration. (Some further points of relevance are included in the my response to Mr D W Smith.)

Mr Smith is correct in assuming that the (approx) 400 inspectors employed by one administration operate primarily as a backup to the statutory surveys carried out by the societies.

With respect to Mr Smith's comments on the additional requirements imposed by Port States on vessels visiting its ports, I would agree that this practice invariably causes problems. I have seen delegations at IMO taken to task by the committee and I too have been on the receiving end following the UK's unilateral action following the '*Herald of Free Enterprise* disaster'. The UK was not now in a position to criticise other administrations who did the same. Such action could lead to retaliation and this has occurred (but not involving UK ships).

I liken IMO to a club – you enjoy the advantages and you should follow the rules. There are major advantages in working to the convention, and whenever requirements over and above those of the convention are imposed (even on one's own ship), there are difficulties.

Under convention principles, unilateral actions should not be taken, but in the real world, this is sometimes felt to be a necessity. Mr Smith rightly comments on the US government's concern for the safety of its nationals travelling on foreign cruise ships. Many preventable accidents have occurred in the past and the USCG are held responsible by the general public for not preventing the casualties. Similarly a large number of casualties involving tankers over 15 years of age have occurred around the US coasts. Both the UK and the USA have obviously felt that such action is necessary despite their strong support for the convention principle. Fortunately such deviations are relatively rare.

M B F Ranken (British Maritime League) The International Maritime Organisation, as the only UN inter-governmental agency in London, has been a considerable success story, and we should pay tribute to Colin Goad who established it on the correct, largely non-political lines in the 1960s in Piccadilly. Mr Srivastava has done a magnificent job over the last nearly 12 years in keeping IMO as a genuinely practical body: 'The sea is a great club' and a great leveller. Britain can take great credit firstly as the country which always took the lead in maritime safety over the past 150 years, and then in becoming the host government to IMO, which has taken over its mantle and expanded greatly the international co-operation on safety. IMO now has a magnificently equipped permanent headquarters, and we can thank earlier heads of the UK delegation for helping to steer that major construction project to fruition; the name of John Archer comes readily to mind some time before Jim Cowley himself took over the mantle.

Dr Cowley explains very well the origins of IMO and its sole role as an inter-governmental consultative body, out of whose deliberations very important safety and other conventions have developed. But it is in no way an executive organisation, and suggestions in a recent paper presented in Hong Kong that it should become one, show a misunderstanding of the means by which the various conventions need to be enforced by national governments, mainly in national waters, by their own admini-

strations, following ratification by a sufficient number of countries.

The executive responsibility for eliminating sub-standard ships rests first with individual Flag States' administrations; since many of these are ineffective, not least amongst numerous open register states, other means have had to be developed by the principal trading countries, and Port State control is the result, now the responsibility of the maritime administrations of the Port States that practise it.

Port State control is potentially the best way of stopping sub-standard ships from trading, and so contributing to the reduction of overtonnage in the world fleet, still at least 20% overall; certainly far too high in most classes to permit freight rates to rise to a level where the owners can earn the replacement costs of their ships, over and above depreciation and operating costs. While Port State control is aimed at safety of operation, and certainly needs to be applied more strictly and extensively, the indirect effects on trading conditions and the achievement of profitability are at least equally important to the future of the shipping industry.

Echoing what others have said, it is most important that everyone in the maritime industries understand how IMO works, and also the responsibilities of national administrations for all executive actions and to implement the provisions of the various conventions. The procedures by which improvements and extensions of the conventions can be achieved also need to be understood, as well as the important input to these procedures that are actively encouraged from numerous non-governmental bodies, as well as international organisations and national delegations. Much of the work in developing traffic separation schemes started in professional bodies amongst the Littoral States around the Channel and North Sea. Even wider input on pollution matters came from many environmental bodies. Trade associations and others have made a major input during the preparation of the various conventions and protocols.

Dr Cowley made a very clear distinction in his presentation between inspections and surveys, and the corresponding responsibilities and functions attached to each. Much criticism has been levelled at Classification Society surveyors 'for not doing an adequate job'. Much of that criticism is due to the confusion between inspections, usually on behalf of a national authority, and surveys, usually on behalf of, or for the benefit of, a shipowner.

There is a very wide range of people and organisations responsible for safety at sea and in ships. There is too little direct contact between many of those responsible, and hence much too little mutual understanding and co-operation. In consequence it is all too easy to blame 'them' for failures, with little regard for who 'they' are. Shipowners, their management and crews, are first and foremost responsible for the technical and operational standards of their ships. They rely on Classification Societies and their surveyors for the minimum standards of construction of their vessels on delivery; the shipbuilders are responsible for quality over and above these minima. National flag administrations and their inspectors are expected to ensure that minimum standards of equipment, crew competence, etc, are met. Insurers sometimes lay down additional strictures for particular cargoes or destinations. Shipping and freight companies may call for additional safeguards. Port authorities and local foreign administrations may stipulate regulations that affect ships further during operation on particular routes. Local political tension or war may involve yet more restrictions in particular regions, eg the recent Gulf war.

The new Merchant Shipping Act, 1988, extends still further the regulations affecting UK flag ships, particularly in bringing shore management more closely into the responsibility loop for

safe operation and adequate equipment, by providing much more onerous penalties for failures by individuals, although these are penal in respect of ships' officers and their rates of pay; some may well seek to insure such insupportable risks.

Quite apart from the normally high standards achieved in the construction and equipping of ships when new, there is constant disquiet about the reliability of running surveys, especially when carried out in outlandish places, simply to maintain ships in class, and by no means always being concerned with maintaining satisfactory standards and safety. Classification Society approval of drawings and construction when new are rarely in doubt, though some extension of what they cover may well be desirable, especially as crew sizes get smaller, and more complex operations are carried out on board ship.

Extension and more effective enforcement of Port State control in as many Maritime States as possible, acting co-operatively, offers the best means of policing safety, although it can never be fully effective when applied only to running ships in which detailed inspections of numerous compartments and systems may always be impossible. Furthermore Port State control cannot easily go beyond inspections of certificates, so far as ships' officers are concerned.

As Dr Cowley rightly says, ship safety is hardly touched by fatality and accident statistics except when there are occasional spectacular losses of life in localities that encourage maximum publicity; these only hit the headlines if they involve people and/or major environmental pollution. Losses far from home, and even the *Derbyshire*, provoke little public outcry, and the most major losses of life in a foreign ship outside European waters hardly merits more than a short paragraph.

Dr Cowley is to be supported in his call for 'near misses' to be reported in some way, with a view to forewarning national administrations and IMO about trends that might lead to serious or major accidents involving loss of life or major pollution. It is questionable whether cost benefit justifications for not introducing new regulations would cut much ice with an enquiry that followed a subsequent major disaster. We may well be able to learn something from the confidential system of 'near miss' reporting now in operation in aviation to help avoid potential accident situations.

Personnel recruitment and training are clearly most important factors for the future, not least in maintaining safety standards. What is being done by IMO in its Maritime University to train administrators is obviously very important; so also is the assistance in several regions around the world, as well as in individual countries, in the training of seafarers, especially deck and engineer officers.

There is now a shortage of junior officers in European countries, and moves are afoot to allow UK owners to employ as junior officers suitable nationals of any of the Member States of the EEC, and also Norway; this is in addition to those from a number of what are now Commonwealth countries that are already permitted under existing regulations.

But these foreign sources are also becoming increasingly depleted; we have recently seen the move by the Indian maritime authorities to restrict Indian officers to Indian flag ships, because they too are short in their national fleet. Competent Chinese, Filipino and other Asian officers are also understood to be in increasingly short supply.

HM Government has introduced certain funds to assist owners in training cadets, as one of the measures in the Merchant Shipping Act, 1988, aimed at sustaining manpower numbers for defence purposes. The manpower initiative launched at the General Council of British Shipping by Paul Channon, Secretary of State for Transport, last November, is

aimed at encouraging recruitment.

But it must be said that as long as cadets are only offered training and a career, tailored solely to service in merchant ships, the numbers coming forward are likely to be insufficient, especially while the Merchant Navy here, and many in Europe, are seen to be declining in numbers of ships on the national flags, whatever may be the true number beneficially owned.

Trained seafarers, whether deck or engineer officers, once they leave the sea, are employed in a very wide range of related and other activities ashore in the City and elsewhere; apart from the large number put ashore as a consequence of the decline in the fleet, there has always been a normal wastage of about 10% (people that have left the deep sea trading fleet and taken employment elsewhere, both ashore and afloat). These people are the essence of the country's maritime capabilities, and need to be cosseted, conserved and above all retained in the maritime sector.

Present methods of training are aimed solely at providing people as ships' officers, who hopefully will in time obtain master's or chief engineer's certificates. But these, though worthwhile in themselves, are no more than 'driving licences' to meet the statutory requirements for operating ships.

If recruitment is to be increased, and careers officers in schools are to be persuaded to encourage young people to volunteer for service at sea, we need to seek ways of offering them a 'through-life' career that offers them more than the statutory certificates at the proper stages in their careers, to backup and maybe follow what is provided in the nautical schools at present. Many have improved their qualifications by their own efforts over many years, not least by way of 'extra' certificates. But there is certainly room for looking at ways of enhancing the attractiveness of service in ships by a new approach to education and training that offers wider opportunities to those that want to grasp them. Impending demographic pressures make this all the more urgent.

There have been too many disasters in the major transport modes over the past year or two, not least in aviation and on the railway in the past few months. The joint Aero-Marine Group of the Royal Aeronautical Society, RINA and the Society for Underwater Technology, with the Nautical Institute, the Greenwich Forum and some others, are presently planning a conference for late 1990 under the title 'Safety at Sea and in the Air - Taking Stock Together'. There is felt to be a good deal that each can learn from the other, not least in accident investigation, now that we have a Chief Inspector of Marine Accidents under the Merchant Shipping Act, 1988. The Institute should be involved in due course.

J Cowley [Britship (IOM) Ltd] Commander Ranken's comments on the origin of IMO, and the UK's role in its establishment support, adds to the information provided in the paper. I would agree that it is too easy to allocate blame 'to them'. Commander Ranken says that shipowners, their management and crews, are first and foremost responsible for the technical and operational standards of their ships. I would go somewhat further and say that the management was primarily responsible because crews should be trained within the company or carefully selected by management. It is not sufficient merely to rely on the fact that, for example, senior officers held the appropriate certificates of competency. Their record and background and ability to do the specific job under the prevailing conditions should be carefully studied before their appointment. I would agree with Commander Ranken regarding the difficulties, in certain outlandish places, of ensuring adequate survey standards although the standards of ships, when new, was rarely in doubt.

There is a natural tendency for shipowners to accept competitive tenders or to request running surveys in ports to which vessels trade. I agree that Port State control should be confined to examination of Certificates of Competency as far as ship officers' certificates of competency are concerned and, as such, could not distinguish between competent and less competent officers. Nevertheless, since the STCW convention, there has been a considerable increase in the standards of officers in general, the introduction of more training centres in developing countries, the growing influence of the graduates from the World Maritime University, the model courses being developed at IMO, and the greater accent on training in developing countries. Improper practices like the issuing of Certificates of Competency by consuls had been virtually eliminated even though this had been almost standard practice for some Flag States in the past.

Whilst I agree with virtually all Commander Ranken's points about the shortage of ships' officers in general, I do not accept that the present certificates are no more than 'driving licences' to meet statutory requirements. This may have traditionally been the case for a candidate taking the Department's Part A and Part B of the statutory examinations which were limited to 'essential' knowledge. This situation applied during the 1950s and before, when it was unusual for candidates to hold exempting qualifications. This situation gradually changed with the introduction of the cadet schemes and it is no longer the case today.

Following the passing of the 1988 Merchant Shipping Act, as Commander Ranken rightly says, Paul Channon launched a new scheme whereby, for the first time ever, the Marine Department contributes towards the cost of training.

Under the scheme (written by a member of the Institute), certain fundamental principles were incorporated. These include a guarantee that cadets or trainees will be provided with support until the completion of their approved course of vocational education and training at sea and ashore. If, for any reason, their sponsoring company cannot continue to provide the necessary training, arrangements will be made for them to complete their approved course. Entrants with the necessary entry qualifications can proceed to a Higher National Diploma. Special arrangements were made for bridging courses for candidates holding academic qualifications at Advanced Level of the General Certificate of Education, and for individual programmes of training approved by the Department for candidates holding exempting qualifications from any part of the Class 2 examinations. This latter provision allows, for example, the holder of an engineering degree to be funded whilst receiving practical training or sea-going experience.

The level of funding is £50 per week for cadets or trainees (of which the cadet must receive a minimum of £40 per week) not eligible for YTS or LEA funding for the whole of the unfunded parts of the approved course. In the case of officers studying for higher certificates of competency, a contribution of £50 per week (payable to the officer) is provided on the same conditions as under the National Maritime Board Agreements. Up to a total of £3.5 M is earmarked for a full year. It has been estimated that the grants available will cut the nett cost of training an officer by some £10 000.

Whilst it is too soon to judge the success of the scheme, it is expected to more than double the annual intake of cadets and to result in the use of the longer course of training. The scheme will be attractive to prospective marine engineers in particular since their potential can be achieved and their employment prospects at sea and ashore will be enhanced by the guarantee of a recognised national qualification and approved training and statutory certificate of competency.

What can be said is that the academic level of the certification and the standard of training will be at least equal to that in any other area of industry. An Incorporated Engineer for example, completing the scheme, may well be tempted away from the sea by offers from shore employers. It will be up to shipowners to provide conditions which remove that temptation and I entirely agree with Commander Ranken's comments in this respect.

J G Beaumont (LR) Dr Cowley stated that where statutory work had been totally delegated to the Classification Societies, statistics showed that the standards of the ships were at their lowest. Dr Cowley said that this was probably due to the total absence of Flag State surveyors on board rather than inadequate action by the class surveyors. I would suggest that standards must also depend on which societies are authorised to do the work. Some large administrations delegate to societies with quite specialised human and technical resources. I would appreciate Dr Cowley's comments on this.

J Cowley [Britship (IOM) Ltd] I agree with Mr Beaumont that some large administrations delegate to societies with quite specialised human and technical resources and I accept that the casualty records of some open register countries are better than those of some traditional maritime countries.

The paper was, nevertheless, correct in its assertion that in general it may be said that administrations which delegate all statutory functions have casualty rates above the world average unless special measures are taken. Such measures include limiting the delegations to certain societies, restricting the age of ships which may enter the register, giving clear guidance to the societies as to their specific responsibilities on behalf of the Flag State and, above all, attracting responsible owners. With respect to the latter point, there is no doubt that certain companies, which formerly registered in the UK, will retain standards far above the world average even though they may be registered in ports which are not recognised as having enviable safety standards.

F A Manning (Retired) I have found this paper most interesting, particularly the description of the working procedures of IMO and the participating national administrations. When I served on one of IMO's *ad hoc* working groups concerned with acceptable noise levels in ships, at the time (1978–1980) the mechanics of achieving a tangible end product was never clear to me. The author has now resolved this matter for me and I thank him.

In Dr Cowley's previous papers I have always been impressed with the accuracy of the detail of any events described. I was therefore somewhat mystified to read, in the brief account of the Bombay Harbour explosion on 14 April 1944, that a vessel named *Jala Padmu* was quoted as being responsible for the catastrophe.

I thought it was common knowledge that the *SS Fort Stikine* (Ministry of War Transport, managed by Port Line) caught fire and exploded that day. The ship berthed astern of it in the Victoria Dock was named *Jalapadma*.

During the past 20 years I have sighted at least four published reports of this incident.

Although there are differing accounts of the quantity and type of explosive carried on the *Fort Stikine* and widely differing casualty lists, all agree precisely as to date, place and the ship's name.

As I docked in Bombay a few months after the explosion I can confirm from personal sighting the aftermath of the disaster. Perhaps Dr Cowley could re-examine the official record

and resolve this discrepancy.

It seems that IMO/national administrations frequently operate a stable door policy after public outcry. This being so, would the author agree that the UK government's decision not to construct a nuclear-powered merchant ship in 1959 was a lucky one for industry and the public?

I wonder what disaster may have befallen seafarers if 'hot-heads' pushing hard for the immediate construction of a UK nuclear-powered tanker had got their way.

Can Dr Cowley say whether any administration, with the exception of the USA, had regulations in force in 1960 to deal competently with the projected fleet of nuclear-powered oil tankships?

Finally, on 4 February 1947, I was serving on a ship at anchor in Hong Kong harbour. On that day the *SS Sai On* which was laying alongside the harbour wall caught fire with a resulting death toll reported in the *South China News* of 149 persons. Since the event I have never seen a report of this disaster in any of the usual reference sources in the Western World.

Does the author know about this incident, and can he advise whether the UK Maritime Administration normally received casualty reports from our colonies at the time?

J Cowley [Britship (IOM) Ltd] In response to Mr Manning, I am glad to hear that the paper has achieved its purpose in explaining how IMO achieves a tangible end product.

I am grateful for Mr Manning's compliment regarding the accuracy of detail of my papers. Regarding the explosion in Bombay on 14 April 1944, Mr Manning was correct in naming the *SS Port Stikine* as the vessel which caught fire and exploded. Even before the receipt of Mr Manning's communication, I had withdrawn the reference to that incident from the preprint of the paper because of conflicting information on the number of casualties. I did not have access to the official report (see below) but would stress that the information on the incident has been taken from a normally impeccably reliable source and a copy of the source document in question has been sent to Mr Manning. He was assured that the error, which had inexplicably occurred during its updating, would be rectified in the next edition.

The Department's marine library could only quote from the publication 'Dictionary of Shipping Disasters' that the deaths in the *Port Stikine* disaster were 336 in total. On the other hand, the 'Port Line Story: Short History 1914-1964' states: 'Casualties amongst personnel of various services and employments were: killed or missing 231; injured 476' and 'the estimate of civilian casualties was 500 killed or missing'.

With reference to nuclear ships, I would say that fashions change. For example, when the US ship *Savannah* visited the UK in the 1950s, members of the professional societies queued up just to get a glimpse into the engine room. Some 20 years later, the visit of the Federal Republic of Germany's ship *Otto Hahn* passed virtually unnoticed. On both occasions, safety assessments were made by a team of the Department's surveyors all of whom had attended post-graduate courses in nuclear physics which included a period of training at the Atomic Energy Authority at Harwell. I am now, of course, retired but was one of the last surveyors to attend such a course (in 1962) and the team is no longer in existence. The team had a special room, facilities, and resources available to it, and, at the time, had the capability to make a safety assessment of any project put to it. The safe assessment procedure was extremely detailed and time-consuming and, consequently, extremely expensive to the Port State. There was undoubtedly some return in terms of experience gained by the team (which has now been lost)

but, had assessments been carried out under the full cost recovery policy applicable today, it would have been yet another major additional cost to the operator of a nuclear merchant ship. The indemnities demanded by some ports were colossal and requirements for the constant attendance of tugs by some port authorities made it virtually impossible for a nuclear ship to enter even though permission to do so was not specifically refused. Further costs to the Port State included the constant attendance on board of a senior surveyor of the Department and the monitoring of the environment around the ships, on behalf of the Department, by Royal Naval personnel.

Under the principles of the SOLAS convention, nuclear merchant ships should be afforded free passage and, to this end, a group, chaired incidentally by a Fellow of the Institute, Charles Bell, developed the IMO 'Code of Safety for Nuclear Merchant Ships'. This 127 page document (resolution A491), produced as recently as 1982, provides extensive guidance for any assessment team which might be formed. It is referenced in Chapter VIII of the SOLAS convention which deals with nuclear ships.

With reference to Mr Manning's final point, in connection with the *SS Sai On*, the UK Marine Department normally received casualty reports from its colonies. However, this practice was discontinued in 1939 and did not start again until the end of 1947. A file is usually opened on casualties of particular interest which occurred even on foreign ships in order that lessons might be learned and amendments made where appropriate to the regulations. However, unless there is some policy reason for their retention, current policy is that such files are only kept for a limited period - generally a maximum of 10 years. Mr Manning's memory is correct in respect of the high number of casualties which mainly resulted from the service of this passenger vessel running mainly to Canton. It carried a very large crew of cooks, stewards and other staff attending to the needs of passengers. The longer serving surveyors of the Hong Kong Marine Department clearly recall this serious casualty.

J Wonham (IMO) I hesitate to comment on Dr Cowley's paper which, bearing in mind the limited space available to him when writing a paper on such a large subject, admirably describes the way in which governments accomplish the objective of 'safer shipping and cleaner oceans' through their co-operation within IMO. The adoption of high standards of construction and equipment of ships, together with mandatory requirements for survey, certification and crew standards, so well described by Dr Cowley, has undoubtedly contributed enormously to the protection of the marine environment.

Furthermore, Dr Cowley rightly acknowledges that 'discharges of oil, dangerous and noxious substances (in bulk and in packaged form) and garbage discharges on the high seas must, from environmental considerations, be controlled by internationally agreed and implemented standards'.

However, in spite of noticeable improvements in shipping standards, the reports of oiled sea birds and beaches that are still so common, bear witness to the fact that ships' crews may still be tempted to dispose of oily wastes and other prohibited substances into the sea under cover of darkness, or when far from land.

Dr Cowley doesn't actually say anything in his paper about the duty of Coastal States to detect violations of the discharge provisions of IMO conventions and to ensure that responsible persons are prosecuted and, where found guilty, punished. An obvious place would have been to include an additional 'box' in Fig 1 under 'Coastal State duties'.

Considerable progress has been made in the remote detec-

tion of illicit discharges of oil through overflights of shipping routes by aircraft equipped with side-looking airborne radar (SLAR) together with ultraviolet and infrared line-scanners. A number of countries, including the UK, make such flights on a routine basis.

I should be grateful if Dr Cowley would add a few words about the national administration's role in Coastal State enforcement of pollution conventions, and the current status of detection of illicit discharges using aerial remote sensing equipment. His answer will, I am sure, be of great interest to the present generation of seafarers!

J Cowley [Britship (IOM) Ltd] Dr Wonham refers to the fact that, despite the higher standards now prevailing, reports of oiled birds and beaches bear witness to the fact that ships' crews may still be tempted to discharge oily wastes under cover of darkness. He had correctly made the point that the paper does not refer to 'the duty of Coastal States to detect violations and to ensure that responsible persons are prosecuted and, where found guilty, punished'.

I agree that this and other duties could have been covered by additional boxes in Fig 1 of the paper under 'Coastal State duties'. It is a duty which is very difficult to perform with tangible results and, to my knowledge, despite the heavy expenditure of resources in the UK, relatively few prosecutions had been achieved. Successful prosecutions under UK national legislation had mainly been brought by port authorities – it was much easier to determine the culprit in the case of ships in port. Even so, only a handful of cases were successful each year.

It was much more difficult to prove violations at sea even from reports from specially equipped aircraft (as opposed to reports from commercial aircraft). Photographs and other evidence had to be sent to the Flag State for alleged violations outside the territorial waters of the Coastal State since the latter did not have the power to prosecute foreign ships for alleged violations on the high seas. Intervention by the Coastal State could only be legally taken under the 'Intervention on the High Seas' Convention, 1969, to 'prevent, mitigate or eliminate grave and imminent danger to their coastline following a maritime casualty'. This does not, of course, cover deliberate or accidental discharge by crews. Prosecutions are thus dependent upon evidence from the Coastal State of sufficient clarity to convince a court or other authority of the Flag State that prosecution is warranted.

Bearing in mind the time to prepare and transmit the necessary evidence and the wholehearted and effective co-operation of the Flag State together with its traditional system of justice, prosecution is not an easy pursuit. A high proportion fail due to insufficient evidence. Many courts require proof that the oil discharged can be identified with the oil in the ship's tanks. Nevertheless, some UK ships detected by foreign Coastal States have been prosecuted as have foreign ships reported by the UK to their Flag States.

This absence of prosecutions does not mean that the efforts made and the expenditure of resources are not justified or fruitful. They have a definite deterrent effect especially in areas outside the main shipping lanes and, if supplemented by a visit from a surveyor on arrival in port (particularly tanker loading ports), the importance which the Coastal or Port State attached to the maintenance of clean seas is demonstrated to potential offenders.

I would agree with Dr Wonham that great progress has been made in aerial detection methods and a few well-publicised prosecutions from the use of SLAR would have a major

beneficial effect in reducing deliberate discharges. It is, of course, regrettable that administrations are compelled to expend valuable resources in attempts to prevent (often otherwise responsible) ships' crews from illegally destroying their environment.

A S Nunn (Scottish Lion Insurance Company) May I say that this is an excellent paper and very explicit. I would like to raise the following points.

1. Nominated surveyors and recognised organisations. The low standard of many Flag State surveyors (with their Classification Societies) is significant and while I was pleased to hear Mr Srivastava's comments concerning the accent on training, it must be remembered that new Flag States are appearing with considerable rapidity! Is the speed with which these appear being noted? Do IMO have the power to adjudicate on the Flag States surveyors or organisations they nominate? I think not. Should they have this authority? It is my concern that however good the conventions and regulations laid down by IMO are, unless the standard of surveyors remains high, and as consistent as possible, much of the value of IMO is lost.
2. Inert gas. It is significant that the early compulsion for tanker owners to incorporate inert gas freeing facilities came from marine underwriters who incorporated the warranty in their insurance policies well before discussions at IMO.
3. I entirely support Dr Cowley's comments on the *Herald of Free Enterprise* – the comments in the paper on the matter and his verbal comments on the use of bulkheads – and I feel sure that while these vessels are vulnerable, if they are responsibly operated they achieve their objective.

J Cowley [Britship (IOM) Ltd] I welcome the contribution by Mr Nunn who has, himself, recently produced an excellent complementary paper on the role of insurers. The number of new Flags is noted and, as Mr Srivastava said, every effort is being made to train personnel to competently man the vessels. The number of members of the organisation is around 133 and there are one or two countries still outside the membership.

IMO has no power to adjudicate on the Flag States' surveyors or the organisations they nominate. The responsibility rests with the Flag State who should inform IMO of the specific responsibilities and conditions of the authority delegated to nominated surveyors and recognised organisations. I do not believe that the member countries would accept the concept of a supra-national body to adjudicate on the organisations they may employ. I agree with Mr Nunn that much of the value of IMO conventions is lost if the standards of the surveys are not high, but the major factor in my view is the standard of the management of the company, as mentioned in responses to other contributors.

It is interesting to note that marine underwriters applied compulsion to owners to fit inert gas before discussions began at IMO. Insurance can thus play a part in helping to prevent casualties providing the arrangements are sufficiently attractive to the shipowner.

I welcome Mr Nunn's support for my remarks on the use of bulkheads in ro-ro vessels and, in this respect, would refer Mr Nunn to the response to Mr Victory.

In conclusion, I would like to thank all the contributors for their valuable comments.

