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A survey of design and operational problems – environmental and regulatory aspects

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Shipowners and shipbuilders in planning for the 1980s need to take into account regulatory and environmental aspects, including requirements resulting from amendments to international agreements such as the Safety of Life at Sea (Solas) Convention and the Oil Pollution Convention which, while agreed by the I.M.C.O. Assembly, are not yet in force internationally. An assessment of such requirements likely to come into force nationally and internationally in future years can only be an estimate since the context is a developing situation open to influence by major events.

Environmental concern is of growing significance and additional requirements may well arise from the 1972 Marine Pollution Conference, possibly leading to a prohibition of all deliberate discharges of oil and other noxious substances into the sea by the 1980s.

There will be increasing emphasis on navigational matters, including the adoption of traffic separation schemes and navigational advisory schemes in such waterways as the Dover Strait, with the possibility of more positive action. There is international pressure which may lead to developments on standards of competency of officers and crews and safe manning of ships. Changes in requirements for ship construction and equipment are likely to arise in the context of amendments to Solas 1960 and to the Oil Pollution Convention.

1. Introduction

In this paper I discuss the environmental and regulatory aspects of design and operational problems. In doing so I speak for myself and not for the Department of Trade and Industry or the government as a whole. On the other hand such wisdom as there may be in my remarks is very largely the product of the staff in the Marine Division. In this paper I seek to give an estimate of what the combined effect on merchant shipping of the regulatory policies of the main maritime nations may be in the years ahead. It is therefore an overall estimate of what on present evidence is likely to happen rather than a statement of measures which particular governments, including our own, will take.

The objectives of governments in regulating merchant shipping and also other forms of shipping have been to maintain and increase safety at sea, to safeguard adequate standards of amenity for seafarers and passengers on ships and at the same time more recently to afford safeguards to the environment and in particular to the coast and to those who are likely to come into contact with ships and their working. All this has, however, to be balanced against the commercial prospects of shipping. At any particular time there has to be an equation between what is necessary for safety and for the protection of the environment and what is desirable if shipping is to operate economically. This equation varies from time to time according to the policies of governments and the pressures of public opinion. Thus of late in this and other countries, particularly developed countries, there has been a substantial change of emphasis with added importance being given to factors which will provide additional safeguards for the environment.

The period of the 1980s sits rather lightly on these remarks. My assessment of possible future requirements from the regulatory and environmental aspect relates to future years. Such requirements are now mainly agreed internationally in the Intergovernmental Maritime

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Consultative Organization and they are then translated by States into their own national legislation and regulations and put into force. All this takes time. The process of securing agreement in I.M.C.O. is often lengthy because of differing national views. Moreover the present procedure for bringing into force various international requirements is even more lengthy and frankly in my view unsatisfactory at the present time. Thus at present new requirements are worked out in I.M.C.O. in the Maritime Safety Committee and in its sub-committees. If agreement is reached they come before the Assembly for acceptance and the Assembly meets only once every two years. But even if proposals are accepted by the Assembly there is then a substantial period depending on the nature of the agreement concerned during which a certain proportion of governments each have to accept individually the recommendation as passed by the Assembly. If this stage is reached then the requirements comes into force internationally, by which I mean that States who are signatories to the Convention in question have to give effect to it after a stated period. This whole process can take a very long time and indeed few, if any, Convention amendments which have been agreed by the I.M.C.O. Assembly have as yet come into effect internationally. This is a very unsatisfactory state of affairs and a number of governments, in particular those of Britain and France, are trying hard to obtain amended procedures so that Convention amendments will be brought into force internationally more quickly. However, the outcome of this lies in the future.

Against this background, it is probably right to regard the 1980s as a period during which the main provisions which have recently been before I.M.C.O. or which seem likely to be agreed by I.M.C.O. in the fairly near future will come into effect. In short, it does seem possible to make some overall estimate of the main lines of future regulatory requirements, though this must necessarily be somewhat vague at this stage. Moreover, the balance could be changed if there was great pressure of public opinion in a number of countries due, for example, to an unfortunate run of accidents. It is not easy to classify the new requirements which are likely to be in force in the 1980s under clear headings, since they are largely interrelated. For simplicity of presentation I shall group them in four main themes – environmental and anti-pollution measures, those concerned with safety of navigation, crew competence and manning questions, and changes in ship structure and equipment.

2. Environmental measures

Dealing first with environmental aspects, there is one major agreed step on the oil pollution side which has not yet come into force internationally, namely the 1969 amendments to the International Convention for the Prevention of Pollution of the Sea by Oil 1954. The existing international controls on oil pollution relate only to prohibited zones of the sea, leaving ships free to dispose of oily residues in any quantity outside the prohibited zones. The 1969 amendments, which resulted from an initiative by the U.K., will close every part of the sea to unrestricted oil discharges and will lay down tight criteria regarding both the quantity and rate of such oil discharges as will be permitted. The new regulations are designed to overcome one of the major weaknesses of the existing Convention, that it is exceedingly difficult in practice to enforce; and to keep within the new criteria ships will be obliged to use the best modern practice and equipment. In the case of crude carriers this will normally mean the 'load on top' system. It is the intention of the British Government, with the agreement of the industry, to bring these requirements into force unilaterally for United Kingdom ships without waiting for

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them to come into force internationally. Canada has already taken this step, and the U.S.A. and Japan have announced their intention of doing so.

There remain problems in making a success of the 1969 amendments and discussions are proceeding in I.M.C.O. One problem is to arrange inspection of ships, for example of tankers in loading ports, to ensure compliance with the requirements. Another is that full compliance with the requirements depends very much on conscientious operation by crews, and on this one cannot always rely. There is a need for the development and wider use of equipment to remove the scope for human fallibility, for example separators, oil content meters and automatic recording devices. Despite these remaining problems, there was a general feeling when the 1969 amendments were adopted that they provided the basis for the final defeat of the problem of wanton oil pollution. Indeed, if they can be properly enforced, they should put an end to the fouling of beaches by deliberate discharges of oil from ships. However, within a year of their adoption pressure developed for a more radical approach. The impetus for this came from the United States, which in a short time has swung from neglect of the environment to acute concern and a willingness to contemplate Draconian protective measures. Public opinion on this side of the Atlantic may not have gone quite as far in this direction, but there is nevertheless growing concern. With regard to pollution of the sea the concern now relates not only to dirty beaches but to the damage which is being done to the living resources of the sea, the importance of which is only now being generally realized. On this subject there is a desperate lack of knowledge. Until recently the capacity of the sea to dispose of unwanted substances has been treated as infinite, but there has been little knowledge of the actual processes which occur. With the growth of population and of technology it has now been realized that the sea's capacity is not unlimited, but much research is still required to find out what can be done safely and what is harmful. To await the outcome of all the current research may be to leave remedial action until too late. This is the spirit underlying the United States pressure for more radical action, which was first applied through N.A.T.O. and has now given rise to a flurry of work in I.M.C.O. in preparation for the 1973 International Conference on Marine Pollution. Although the drive came from the United States, pressures along similar lines are developing all over the world, and if I.M.C.O. did not tackle this problem there are others who would. Marine pollution is also on the agenda of the United Nations Conference on the Human Environment 1972, and of the Law of the Sea Conference 1973.

It is too soon to forecast what requirements will emerge from the 1973 Conference on Marine Pollution, but the ambitious objective has been adopted of achieving by 1975 if possible, or, if not, at least by the end of this decade, the complete elimination of deliberate pollution of the sea by oil and other noxious substances and the minimization of accidental spills. The matters to be covered are already apparent.

As regards deliberate discharges of oil, I.M.C.O. has set in hand intensive study of the technical feasibility, the cost, and the level of success of various alternative techniques, including the further development of 'load on top', segregation of ballast water, cleaning of cargo tanks in port, and discharging all contaminated ballast water for treatment ashore. It remains to be seen which of these approaches, or what combination of them, will be adopted. In the longer term there are plainly great attractions in designing ships with permanent ballast tanks so that oil and water do not have to be mixed. It seems probable therefore that during the 1980s some of these requirements will have come into force internationally as sequel to the 1969 Amendments to the Oil Pollution Convention.

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I.M.C.O. has also now taken up for the first time the question of deliberate discharges of substances other than oil in the course of tank washing etc. Plainly some of the chemicals now being carried in bulk are likely to be much more harmful to the marine environment than oil, and it seems likely that some control will be appropriate. Another form of deliberate discharge now being considered for the 1973 Conference is that of ship-generated sewage and garbage. In our view this is largely an amenity problem – the garbage floating ashore from cross-Channel ferries is notorious – but in respect of sewage particularly there is a need for international action to avoid different countries imposing different and inconsistent requirements. The equipment required can be very costly, especially for passenger ships.

The 1973 Marine Pollution Conference is also likely to have before it several measures for the minimization of accidental spills. We have already reached agreement in I.M.C.O. on the important matter of the limitation of oil outflow and tank size in large tankers and most governments certainly believe that these measures are likely to lessen the chances of catastrophic oil pollution in the event of a collision. It is highly likely that these measures will come into force internationally in the next few years certainly before the 1980s. Apart from tank size, however, a great deal of work is being undertaken in I.M.C.O. in order to lessen the danger from the carriage of chemicals and other noxious substances. Thus, the ship construction requirements for the containment of noxious substances carried in bulk are being reconsidered from the point of view of the protection of the marine environment as well as the protection of human life. Similarly the requirements for the packaging of dangerous goods are being reconsidered to ensure that substances will not escape into the water where these are potentially most harmful if packages get into the water by accident. The recent threat to Cornish beaches from drums of chemicals washed ashore from a sunken vessel will give emphasis to the necessity for such measures and also for a warning system to coastal states where a ship carrying hazardous cargo loses the whole or part of its cargo by casualty or other reason. While there is much work to be done on these requirements it would seem likely that by the 1980s or earlier provisions of this kind will have come into force internationally on a mandatory basis.

3. Safety of navigation

Turning now to my second main theme, the past few years have seen an acceleration in the rate of introduction of measures to improve safety of navigation at sea. In the past, collisions and strandings affected only shipowners, passengers and crews, and safety measures improved steadily but slowly. The new impetus has undoubtedly been brought about by the modern practice of carrying potentially dangerous cargoes in ever-increasing quantities. Collisons are no longer solely the problem of the seafarer and the shipowner. Governments are beginning to take the problem very seriously and, as in many other fields, it is the U.K. government which is taking the lead.

Several reforms seem long overdue. Once again we are discussing a unified buoyage system for international waters and hope to be more successful than in 1936. This is particularly important for the marking of wrecks, and the International Association of Lighthouse Authorities is working urgently on proposals. By the 1980s one would certainly hope to see a completely rational system of charts with a single series of charts for each sea area: charts of different countries are not at present compatible in terms of scale or area covered.

The new I.M.C.O. requirement for vessels to go in the approved direction in traffic separation

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schemes should be ratified by the mid-seventies. The U.K. government has already established a surveillance system to detect offenders in the Dover Strait scheme. The requirement will shortly be imposed on British ships and it is hoped that other flag states will do likewise with their own ships in advance of international ratification. Several international requirements for the carriage of navigational equipment are in the pipeline awaiting ratification. A resolution of the I.M.C.O. Assembly in 1968 will require all ships larger than 1600 gross tons to be fitted with an approved radar and facilities on the bridge for plotting. On international voyages they will be required to carry a gyro compass. All new ships greater than 500 tons on international voyages will have to be fitted with an echo-sounding device. More stringent controls over the use of automatic pilots in areas of high traffic density, navigational hazards or restrictive visibility will also be applied. A further requirement will oblige vessels to carry adequate and up-to-date charts, sailing directions, lists of lights, notices to mariners, tide-tables and all other nautical publications necessary for the intended voyage. The I.M.C.O. Assembly also recommended that ships carrying oil or other noxious or hazardous cargoes in bulk should carry an efficient electronic position-fixing device suitable for the trade in which they are employed.

The last decade brought the rapid development of advisory systems at the approach to ports. There is certainly a need for increased cooperation between ships and shore-based advisory systems, and this could be the dominant theme in the 1980s. One can foresee that advisory systems may be established in narrow and congested waterways such as the Dover Strait. The British Government are already taking certain steps to improve navigation in the Channel in the near future. But we are also appraising the Channel problem in the longer term, and the results of this prototype study will undoubtedly be significant for similar waters in other parts of the world. We and the French will be considering in the light of this and other studies the possibility of setting up some form of comprehensive advisory system to assist the masters of all ships using the Dover Straits. If progress is made there may then have to be discussions on a wider international basis. This will inevitably entail time and much work.

Once an advisory service is established for a congested area of sea, some marine services currently provided by individual coastal states might possibly be handed over to the area navigation service. Activities which immediately spring to mind include pilotage, hydrographic surveys, dredging, wreck clearance, the provision of lights and buoys and coordination of navigational warnings. To assist the smooth working of area navigation services, new international requirements for the carriage of additional aids such as v.h.f. radio and transponders for recognition purposes may be desirable.

Special attention to the problem of hazardous cargoes or those which can cause pollution will be increasingly necessary in the coming years and special measures, over and above the normal safety requirements, may need to be adopted by companies engaged in moving such dangerous cargoes. Compulsory pilotage in congested waters is one possibility that is often suggested. This may come at least for ships which involve particular difficulties or hazards. An alternative, used already by some major shipowners, is to arrange for specially trained extra officers to be put on board in congested waters. It seems likely that pilotage services will need to be rationalized, probably on an international basis.

The establishment of an advisory system in congested waters holds out the possibility of special controls for dangerous cargoes. It might be possible, for example, to arrange for all vessels carrying more than a specified quantity of particular dangerous cargoes to be fitted with

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transponders and special communication facilities so that they could be readily and continuously tracked through the system and given special advice, perhaps even amounting to a form of positive control. Ideally such control would be brought into operation by voluntary cooperation, but the hazards are potentially so grave that action may need to be taken in any event. There is therefore a substantial list of navigational measures which may well be agreed and come into force internationally in whole or in part over the next decade. It will be essentially a developing situation in which the pressure of public opinion on the attitudes of Governments will play a part.

4. Crew competence and manning

Technological developments and changes in the size and nature of ships have led to radical changes in the general nature of the merchant fleets throughout the world and in manning standards and operational techniques. Both British and foreign shipowners have in recent years been increasing their efforts not only to improve the efficiency of operation but also to develop new methods of manning to meet changes in ship design, equipment and operation. These new arrangements may involve general purpose manning or flexibility between departments on board ship according to the ship type and trade. Their advantages include a more flexible and efficient use of manpower leading to a reduction in the size of crew with a consequential saving in operational cost and the broadening of the knowledge and skill of individual crew members enabling them to earn more and improve their status. In a competitive industry such as shipping shipowners want to derive the maximum benefits from technological developments and therefore the trend is for them to seek to have smaller but more highly trained and more highly paid crews.

Although, however, this is one trend, there is also increasing concern in a number of countries at the threat to the environment caused by the danger of marine pollution arising from deliberate discharge and from accidents and there is therefore strong pressure for improvement in navigational standards. While merchant shipping is increasing in tonnage worldwide and while much attention is being devoted internationally and nationally to the improvement of safety at sea nevertheless the total number of accidents expressed as a percentage of the world tonnage lost is on the increase.

Against this background, I believe that in the years ahead we must expect increased pressure internationally for agreed international minimum standards of competency and certification of ships' officers and for their training, and for the keeping of a safe navigational watch. I do not under-estimate the difficulty of reaching international agreement on any of these matters, but the pressures to reach such agreement in the years ahead may well be very strong. Thus by the 1980s something positive will probably have been achieved. This move towards minimum international standards of competency, certification and watchkeeping may at a certain stage cut across the economic pressures for a reduction in the size of crews. The resulting equations are likely eventually to be enforced in the statutory regulations of many maritime countries.

In this country at present we have relatively few requirements concerning the standards of competency on British ships and their manning. It is remarkable that on home trade cargo ships we do not require at present the carriage of any certificated officers. Such a state of affairs has been allowed to persist largely because overall the British safety record has been good. Nevertheless, in present conditions further improvement is desirable and the present system

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affords a poor basis for any pressure from the British Government to achieve common minimum international standards such as I have described. In this country, therefore, it is now government policy to extend statutory provisions to require the carriage of certificated officers with adequate training and the enforcement of suitable manning standards throughout the British merchant fleet. Any new structure of requirements should contain some flexibility and pay regard to economic as well as to safety and environmental factors. These are, of course, difficult and complicated subjects requiring consultation with both sides of the industry before requirements can be laid down, and this process will therefore take time. Nevertheless, because of public concern with environmental and navigational matters, there is now considerable pressure for results and this must be heeded.

Thus it is likely that a measure of international agreement on common minimum international standards will have been achieved by the 1980s, and for British shipping it is intended that there will be specific regulations in force on extended certification and on manning well before the 1980s.

5. The structure of ships and their equipment

The fourth group of measures on which developments are likely by the 1980s is that relating to ship design and equipment. These developments will stem largely from the work of I.M.C.O. designed to improve safety at sea. They will therefore be directed towards reduction of the world casualty rate or towards the reduction of the hazard to the environment or both.

I should like to put such measures in general perspective. The percentage of world tonnage losses through casualty is rising despite all the work that has been done internationally and nationally to improve safety at sea. The British safety record on the other hand compares well on the whole with those of other major maritime nations. There is in I.M.C.O. pressure for improvement in the design of ships in various ways. Many countries are anxious to see such developments because they feel that it will improve safety at sea and in particular the safety of their own fleets and because they desire to have the backing of international standards in order to introduce their national improvements. There is less economic disadvantage for shipowners in building ships to improved standards if these have to be introduced on a general rather than on a single country basis. In this country we are anxious to see improvements agreed internationally in various fields, in particular to lessen marine pollution and to improve navigation and in some matters of ship construction. But this means that we have to be ready to cooperate in some other improvements also.

I shall only refer briefly to passenger ships. Here we have the significant measures relating to improved safety against fire which have come to be known as Parts G and H of the Safety of Life at Sea Convention. Neither of these is yet in force internationally, though the point may not be very far off when passenger ships will have to comply with Part G. However, many new passenger ships are in fact being built throughout the world to Part H standards. I believe that it would be right in looking at the 1980s to estimate that by then new passenger ships coming into service will have to comply with these requirements.

Turning to cargo ships and tankers one of the main causes of casualty at sea has been fire and much work in I.M.C.O. has been directed to improving fire safety standards. While there is not yet agreement on a new standard of fire safety measures for cargo ships I believe that it is highly probable that such measures will be agreed during the years ahead and that they will

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come into force by the 1980s. Concern is probably even greater with regard to the fire safety of tankers and the prevention of explosion hazards. Here too I would expect internationally agreed measures to come into force on a mandatory basis in the years ahead. On tankers we already have the I.M.C.O. Code on Tanker Construction and international agreement on measures for the limitation of oil outflow and tank size in order to minimize the possibility of a catastrophic oil pollution incident arising from a collision where the ship does not sink. It is likely that these measures will be enforced internationally well before the 1980s.

The other field to which I should like to draw particular attention is the increasing number of liquid gas and chemical carriers. With the growing emphasis on the protection of the environment I expect that Governments will become increasingly anxious to see internationally agreed standards mainly designed to protect the environment as well as the crew laid down on a mandatory basis. It is likely that there will be heavy pressure for this in the years ahead and that such standards will be enforced by the end of the present decade.

In addition there are a number of other measures. Some of the problems in vessels with unattended machinery spaces which will affect the designs of the 1980s are now being tackled, with special reference to the reliability and maintenance of control alarm and automation equipment. The Convention arising from the 1970 I.L.O. Conference will require improvements in certain aspects of crew accommodation involving such equipment as air conditioning and control of noise in both crew accommodation and elsewhere in the ship such as machinery spaces. A number of existing recommendations on fishing vessels, including water-tight and weather-tight integrity and intact stability may well acquire mandatory force in the future. It is likely that the International Conference on the Safety of Fishing Vessels provisionally envisaged for 1975 will give rise to new requirements on such things as standards of strength, integrity, stability, fire safety, crew accommodation and safety equipment. In the U.K. we are meanwhile developing our domestic Rules under the Fishing Vessels (Safety Provisions) Act 1970.

Other matters on which international action leading to new requirements is likely in the not too distant future include some measure of substitution of liferafts for lifeboats, subdivision and stability in the damaged condition of passenger ships and measures to improve the manoeuvrability of very large ships.

6. Conclusion

Finally, I should like to refer to the proposed I.M.C.O. Conference to revise the Safety of Life at Sea (Solas) and Load Line Conventions. This is at present projected for 1976 but could well be later. There is moreover some disagreement about what sort of conference it might be. Some contries such as Britain regard it primarily as an editing exercise and one which would not of itself generate new measures other than those which are at present under consideration or which are likely to be put forward in the normal course. On the other hand, there are countries who take a much more positive view about the conference and who see it as likely to revise substantially the Solas and Load Line Conventions. It is impossible at present to say what the outcome may be and in any event the results of the conference may well not be in force by the 1980s. Whatever happens at such a conference, my guess is that the main features of future international regulatory action from the safety and environmental aspects will be those to which I have referred. But I must emphasize that my remarks can be no more than an estimate of what seems likely to happen internationally in the future.

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To sum up it seems likely that there will be considerable development in the years ahead in regulatory requirements and that these will mainly be based on international agreements. On the whole they will apply to new rather than to existing ships. The mainspring will be improvement of safety of life at sea and the preservation and protection of the environment with the latter motive assuming increasing importance. These reasons for regulation will have to be balanced and considered against the economic prospects of shipping. It is out of this equation that the actual international and consequential national requirements will come.

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