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Sub standard tankers

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ABBREVIATIONS USED

Flags

Li	Liberia
Pa	Panama
Gr	Greece
Br	Great Britain
Cy	Cyprus
Am	United States
It	Italy
No	Norway
Ko	South Korea
Ja	Japan

General

Wrt	with respect to
No	number of
%	percentage
Av	average
GRT	Gross Registred Tonnage
Dwt	deadweight
n.m.	nautical mile

Type of accidents

ER	engineroom
CL	collision
ST	stranding
EF	explosion/fire
SF	structural failure
Or	other

Organizations

ICS	International Chamber of Shipping
INTERTANKO	International Association of Independent Tanker Owners
CHRISTAL	Oil Companies Institute for Marine Pollution Compensation Ltd.
IPIECA	International Petroleum Industry Environmental Conservation Organization
The E. and P.-Forum	International Oil Industry Exploration and Production Forum
ILO	International Labour Organization
ITF	International Federation of Transport Workers
IMIF	International Maritime Industry Forum
FACS	Federation of American Controlled Shipping
MIT	Massachusetts Institute of Technology
NAS	National Academy of Science
IMPA	International Maritime Pilots' Association
EMPA	European Maritime Pilots' Association
ITOPF	International Tanker Owners Pollution Federation

Contents

Preface

General outline of the problem

The problem of "sub-standard" tankers has as yet not been thoroughly investigated. Up to now much attention has been paid to the development of the so-called flags of convenience, and the results of this development. In the investigations into these flags of convenience little or no distinction was made between the owners operating under the various flags. The phrase "flag of convenience operator" is too much of a generalization.
It should be clear that not all owners/managers with vessels registered under such flags can be considered sub-standard operators. From a financial and/or operational point of view, registration under a flag of convenience can be beneficial. Much will of course depend on the position of the particular owner/manager, for example, with regard to his tax position. No owner/manager should consequently be blamed for selecting the most advantageous financial and/or operational proposition available to him. He is working in an international environment and is subject to international competition.

An owner can, however, be blamed for misusing the lack of supervision under certain flags by not complying with internationally-accepted operational standards. Examples of such standards are the norms laid down in the various IMCO conventions. Control on the implementation of these standards is in the hands of the various national shipping authorities.
Flags of convenience are usually identified with lack of supervision and are consequently associated with sub-standard operations. However, one of the conclusions of this report is that a great many incidents which occur to flags of convenience vessels involve human failure of some description. As there are no international manning standards with respect to quality and quantity of crew, there clearly exists a gap in international legislation.

There are signs that there is a growing international awareness of the need to eliminate the sub-standard tanker problem.
The recent "Argo Merchant" case has once more emphazised that apart from an increased pollution risk, sub-standard tankers produce other detrimental effects. Such effects appear in the form of a surfeit of international maritime legislation, incrased collision risk, a distortion of competitive positions, etc.

The purpose of this study is:
i. to ascertain in which sections of the tanker fleet sub-standard tankers can be found;
ii. to determine trends in size, age, flag, ownership, type of accident, etc.;

iii. to estimate the size of the problem in relation to the world tanker fleet;
iv. to determine whether the problem is a temporary one or not;
v. to consider the consequences of the existence of sub-standard tankers;
vi. to examine the position of existing organizations and their contribution towards the elimination of the problem;
vii. suggestions for improvement.

Conclusions

1. The proportion of incidents with Greek, Liberian, Panamenian and Cypriot tankers is above average.
   The main cause identified for this high proportion is poor manning.

2. The size-group from 11–20,000 GRT accounted for 49% of the total number of incidents recorded.

3. The age-group of 16 years and over was responsible for 56% of the total number of incidents.

4. There are grounds for believing that 75% of the incidents were due to human operating errors in some form or another.

5. The proportion of incidents occurring in oil company-owned vessels in relation to independently-owned vessels is low. The ratio involved was in the region of 1 to 7.

6. **Greek flag tankers**
   No clear relationship existed between age, size and incidents recorded. The high accident ratio of 1,86 (world average = 1,0) could only be explained through the existence of sub-standard management and manning.
   The number of sub-standard tankers operating under the Greek flag was estimated at approximately 175 vessels.

7. **Liberian flag tankers**
   The analysis of the incidence of accidents in Liberian tankers indicated that the proportion of accidents occurring in the 11–20,000 GRT size-group and the age-group of 16 years and over, was above average. The size-group of 11–20,000 GRT represented 24% of the Liberian tanker fleet, but was responsible for 46% of the accidents. Similarly the age-group of 16 years and over accounted for 29% of the Liberian tanker fleet but was involved in 65% of the incidents.
   Further investigation of the above mentioned groups showed that 45% of the vessels concerned were under Greek management/ownership, with a further 20% owned/managed by American interests.
   The number of sub-standard tankers under the Liberian flag was estimated on approximately 150–200 vessels.

8. **Cypriot flag tankers**
   Vessels of 16 year and over accounted for 82% of the tanker fleet under

the Cypriot flag. The 11–20,000 GRT size-group represented 71% of this tanker fleet but was involved in 86% of the incidents recorded. 92% of the tankers involved in accidents were under Greek management/ ownership.

The number of sub-standard tankers under the Cypriot flag was estimated at approximately 20 vessels.

9. **Panamanian flag tankers**

Similarly under the Panamanian flag the 11–20,000 GRT size-group stood out. This group represented 39% of the tanker fleet, but was involved in 53% of the incidents. The age-group of 21 years and over accounted for 23% of the tanker fleet, but was responsible for 63% of the accidents recorded.

It is striking to see that in spite of the large share of oil company-owned tonnage in the above mentioned groups, these vessels were not involved in any of the incidents. 45% of the tankers in the 11–20,000 GRT group and 46% in the age group of 21 years and over were oil company-owned.

The number of sub-standard tankers under the Panamanian flag was estimated at approximately 30–50 vessels.

10. The total number of sub-standard tankers was estimated at 13–15% of the world tanker fleet, i.e. approximately 450 vessels. In this report only tankers of 6,000 GRT and larger were considered.

11. An operational comparison for the year 1973, between 37 tankers owned by a Greek tanker operator and 37 oil company-owned tankers, pointed to some substantial differences in operational quality. The oil company-owned tankers were involved in some 10 incidents, most of which were relatively minor. The resulting number of days lost was estimated at 10, i.e. 0,5 days per vessel per year.

On the other hand, out of the 37 Greek-owned tankers, 28 were involved in accidents.

Several tankers were, in fact, involved in more than one incident. In many cases the damage sustained was serious. The total number of days lost as a result was estimated at 1072 days, i.e. 29 days per ship per year.

12. The present tanker crisis is helping to eliminate the problem of sub-standard tankers. This is being achieved by increased scrapping and laying up of older independently-owned tonnage. However, given the fundamental causes for the existence of sub-standard tankers, this contribution can only be a temporary relief.

13. The consequences of the existence of sub-standard tankers are more serious than environmental problems alone.
Other serious consequences are unilateral action, increased international legislation and the undermining of IMCO's task as an international rule-making body.

14. An attempt has been made to put the oil pollution problem caused by accidental tanker discharges in perspective.
Approximately 5–7,5% of total direct marine oil pollution is caused by tanker accidents. Nevertheless, the impact of such accidental discharges must not be underestimated as a localized environmental hazard.

15. Until now, IMCO activities have mainly consisted of improving technical safety. In the light of the present standard of technical safety, it would appear that the ultimate objective of safety at sea would best be achieved by paying greater attention to the human element in accident occurrences, i.e. the raising of quality standards in this respect.

Introduction

Maritime safety

As ships increase in number, size and speed and their cargoes carried become more dangerous, the need for safe ship operations becomes even more important, especially if the operations involve navigation in or near densely populated and highly industrialized areas already burdened by a heavy local ecological load.

IMCO is responsible for providing ship construction, equipment and operation safety standards. The task of implementing and controlling these safety standards is in the hands of the national governments through the national shipping authorities.
Ship operation safety standards fall into two main categories:

i. technical standards
ii. human standards.

Technical standards may be sub-divided into:

a. constructural requirements
b. equipment requirements.

Human standards can similarly be sub-divided into:

c. education and training requirements
d. manning scale requirements.

Technical and human standards together determine the achievable safety of the transport system "ship".

The main role of the human operation is two-fold:

i. to maintain the technical standard throughout the operating life of the vessel;
ii. to maintain an adequate operating standard in accordance with international and national rules and regulations and with accepted standards of proper engineering and good seamanship.

Control over this total maritime safety concept is in the hands of the national shipping authorities.
At present such control is most strict over construction and equipment requirements, and weakest over the human element, especially the operational part.

Maintaining technical and human operating standards is a direct cost item for the owners of the vessel. The measure of control exercised by national authorities over these standards is not uniform. Some nations have strict controls and may even go beyond IMCO requirements, others exercise hardly any control at all.
A few nations are not associated with IMCO and let owners operating under their flag set their own standards.
Besides these differences in safety standards and controls there are also national differences as regards:

- taxation
- labour cost
- registration cost
- others

Wherever safety control is poor and combines with certain management/ owner policies, this may lead to the existence of sub-standard vessels. Sub-standard vessels have the following characteristics:

- they are often old
- they were a second-hand acquisition
- they are inadequately manned as regards quality and/or quantity
- they are poorly maintained
- they are badly navigated
- they suffer from many equipment failures.

An unfortunate recent reaction to serious vessel accidents, especially those with environmental consequences, is the threat of unilateral legistation and/or measures.

The motivation for unilateral action is mainly the time element involved in remedial international action, which takes much time from inception to implementation.
Since the accident rate of sub-standard vessels appears to be considerably higher than the accidents rate of "standard" vessels, there is a direct link between sub-standard vessels and unilateral legislation. It is also unfortunate that the proposed unilateral action is often applicable to all shipping, rather than to the source of the problem. Furthermore, such legislation is usually concerned with construction and equipment, i.e. technical safety only.
The reason for this is that the authorities concerned have no control over the human element. Consequently the disparity between operating standards remains. In fact, legislation applied in this manner might create more rather than less sub-standard vessels (see 2 in Fig. 1).

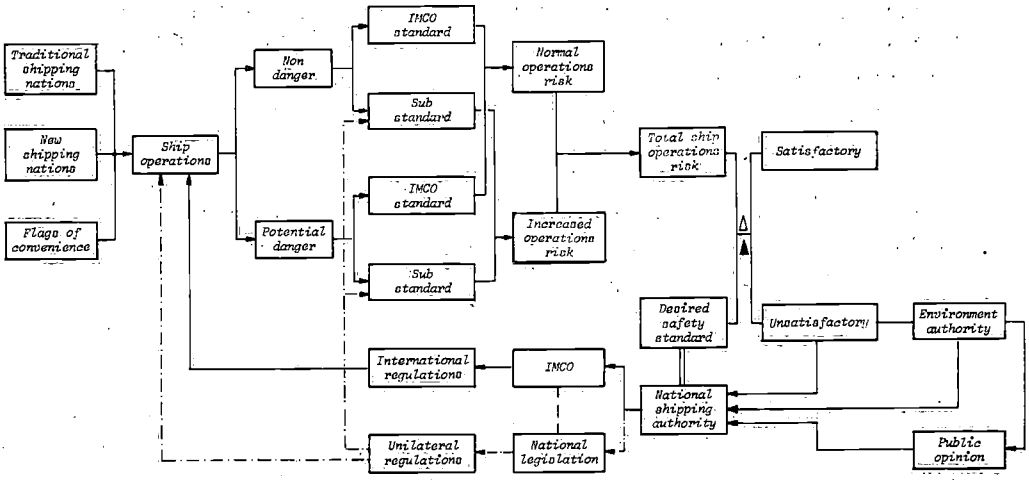
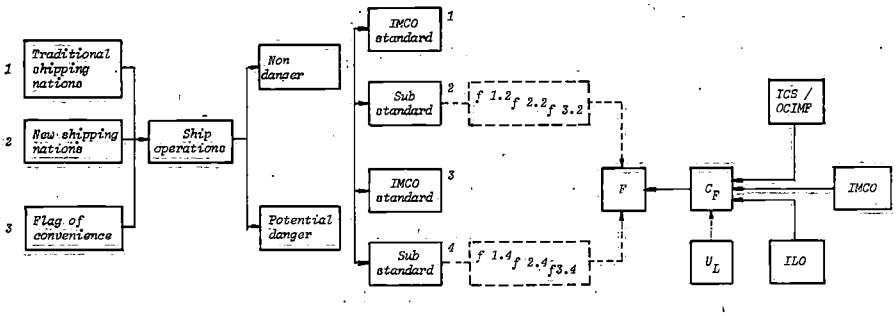


Fig. 1

In order to eliminate the sub-standard vessel problems it will be necessary to obtain control over the sub-standard vessel generating factor shown in Fig. 2. This generating factor is a product of many varied elements, such as taxation structure, manning requirements and costs, political climate, entrepreneurial freedom, etc.

Control over this factor could probably be achieved by closer co-operation between, among others:

i. shipowners associations (ICS & OCIMF)
ii. national shipping authorities (IMCO)
iii. classification societies
iv. port authorities (IAPHA)
v. pilotage authorities (IMPA)
vi. insures (IUMI)



f = national sub-standard vessel generating factors
F = world sub-standard vessel generating factors
C_F = measure of control over F
U_L = unilateral legislation

Fig. 2

In this report we have endeavoured to localize the sub-standard tanker problem and to ascertain its extent. We hope that the results obtained can can serve as a guidance for further action against this problem (see Fig. 1, 2 and 3).

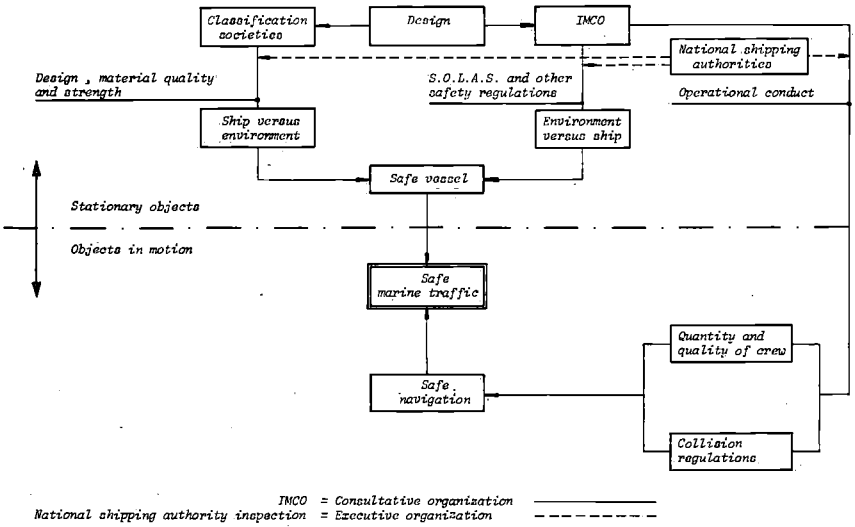


Fig. 3

1 Definition of the term "sub-standard"

As a first step it will be necessary to define the term "sub-standard" as it is commonly referred to in shipping circles. Without a clear demarcation of what the term "sub-standard" can entail, it is not possible to make conclusions with respect to the size of the problem and the measures required to combat it.
In general it can be said that "sub-standard" is associated with:

a. age and condition of the vessel
b. quality and quantity of crew
c. operational efficiency
d. consequences for:
   i. crew
   ii. environment
   iii. other operators.

When using the term "sub-standard", one automatically associates this with a norm which is acceptable. In shipping circles, this norm tends to refer to the standards which are laid down by IMCO. For instance, one can quote the 1960 SOLAS Convention. It is, however, not sufficient to consider a ship "sub-standard" by looking at technical requirements alone. Naturally a ship can be sub-standard through shortcomings in her hull, machinery and equipment. More often, however, nowadays a ship can be considered sub-standard because of her crew. Little or nothing has been done by way of investigation in this field and IMCO standards do not apply.
Taking this factor into account, it is perhaps possible to define a sub-standard ship as follows:

> a substandard vessel is a vessel which does not fulfil the requirements laid down by the various IMCO standards and/or does not comply with the crew standards, which are generally accepted by the reputable, traditional maritime nations. A vessel identified as such can be considered a potential danger for her crew, cargo, as well as her environment.

Several international bodies have considered the sub-standard tanker problem or sub-standard ship problem in general and have provided guidelines to identify these vessels.
The International Labour Organization (ILO), for instance, states that a ship can be considered sub-standard if it does not comply with the various IMCO and ILO conventions. The standards include accommodation, food, working conditions, as well as shortage of equipment, the mal-functioning of equipment, structural defects, etc. If one or more of the indicated areas

in any way endangers the safety of the ship or her crew, the ship is considered to be sub-standard. This approach is, of course, clearly directed towards the tasks the ILO has set itself to achieve. Therefore there is no provision within the ILO stipulations to deal with the consequences of sub-standard vessels on, for instance, the environment.

IMCO has also considered the sub-standard vessel problem and the Maritime Safety Committee has issued a set of criteria and guidelines. In resolution A.321 (ix) it is stated that a ship can be regarded as sub-standard:

a. if the hull, machinery or equipment are below the standards required by the various conventions, owing to, inter alia:
   i. The absence of equipment or arrangement required by the conventions.
   ii. Non-compliance of equipment or arrangement with relevant specifications of the conventions.
   iii. Substantial deterioration of the ship or its equipment because of, for example, poor maintenance.
b. if these evident factors as a whole or individually make the ship unseaworthy and put at risk the life of persons on board if it is allowed to proceed to sea.

In the introduction to this Resolution it is stated that it is necessary to give the Convention "full and complete effect so as to ensure that from the point of view of safety of life a ship is fit for the services for which it is intended".
It is clear, however, that sub-standard vessels have a considerable negative effect in areas other than the ship and its crew. Examples of such effects have been given previously and included increased collision and pollution risk, a surfeit of international maritime legislation and the danger of unilateral measures.
These external effects are serious as they have grave consequences for the environment, other "standard" operators, etc. In the light of such drawbacks it can be said that even if the actual size of the sub-standard ship problem is relatively small, it should still be given due consideration. By way of example the "Torrey Canyon" case can be quoted. The direct consequence of this stranding was not merely oil pollution.
A more serious consequence was the resultant flood of international maritime legislation. The recent incident with the "Argo Merchant" may well lead to the introduction of similar measures.
In general, it can be said, that to aim for high safety norms is a commendable aim. Nevertheless, it is equally true to say that general requirements with respect to safety should be based on a need related to the world fleet as a whole, or at least a considerable part thereof. General requirements

should not be based on the sub-standard operations of a minority group. In such a case the requirements should be directed towards the minority group in question. Attempts should be made to relate both cause and remedy. In the tanker industry in particular one often has the impression that this is not always the case.

Another related point is the problem associated with the effectiveness of measures proposed and/or taken.
The recent United States proposals concerning standards for oil tankers over 20,000 dwt and calling at United States ports may be quoted as an example. Proposals of this kind often have a political and/or emotional basis. The question could be asked whether the effectiveness of such drastic proposals has in any way been demonstrated. Has any attempt been made to estimate the expected level of reduction in oil pollution?
Even such estimates would not be sufficient, given the substantial, financial consequences of the said proposals. Adequately conducted cost-benefit analyses carried out on a socio-economic level would be more appropriate. There are an increasing number of people within the tanker industry who share this view.

2 The tanker market

In order to determine in which section of the tanker market sub-standard tankers are likely to be found, it is necessary to have some understanding of the operational characteristics of this market. Often, for example, the important place occupied by the independent tanker owners is not fully appreciated. It is for this reason that the following outline may prove useful.

Characteristics

In principle three different groups can be identified:

a. tanker tonnage owned by the oil companies
b. tanker tonnage owned by independent owners but chartered for longer periods to the oil companies
c. tanker tonnage owned by the independents and operated on the spot market or chartered to oil companies for relatively short periods, e.g. maximum one year.

The above mentioned groups are not mutually exclusive. For example, in times when freight rates are low and the supply of tonnage exceeds demand, oil company-owned tonnage can be found operating on the spot market.
The tanker tonnage owned by the oil companies has not been constant and has varied to a certain extent with the situation in the world market for oil and associated products. The position of the oil companies in relation to to the share of the independents has deteriorated. This is fully illustrated by the following figures:

Oil co's share	1960	1965	1970	1976
of world tanker fleet (% of dwt)	44%	43%	39%	38%

For the purposes of this study it is more appropriate to consider the number of tankers, rather than deadweight or gross registered tonnage (GRT) capacity. Table 1 gives an impression of the division of tonnage with respect to size and ownership as on the 1st August, 1977. Obviously this position is influenced to a certain extent by the present crises within the tanker market.

Table 1 shows that on the 1st August, 1977, the independents owned 55% of the total number of tankers (> 10,000 dwt) in the world tanker fleet. In terms of deadweight capacity the percentage is higher and amounts to over 60%. A glance at new building programmes indicates that no major variations from the present position can be expected in the near future.

Table 1. Distribution of tonnage wrt, size and ownership (1-8-1977).

ship size dwt × 10^3	seven majors		other oil co's		independents		total	
	no.	%*	no.	%*	no.	%*	no.	%**
10– 19.99	57	11.5	266	53.8	171	34.6	494	14.7
20– 29.99	130	26.5	130	26.5	230	46.9	490	14.6
30– 49.99	113	18.5	169	27.8	327	53.7	609	18.1
50– 69.99	46	14.9	66	21.4	196	63.6	308	9.2
70– 99.99	45	10.8	90	21.7	280	67.5	415	12.3
100–124.99	17	12.2	39	28.0	83	59.7	139	4.1
125–174.99	6	3.2	63	33.5	119	63.3	188	5.6
175–224.99	44	29.3	8	5.3	98	65.3	150	4.5
225–299.99	113	23.6	71	14.9	294	61.5	478	14.2
300+	39	41.0	5	5.3	51	53.7	95	2.8
total	610	18.1	907	26.9	1849	55	3366	100

* Percentages are expressed as a percentage of size-group.
** Percentages are expressed as a percentage of the total number of tankers in the world tanker fleet.

Reasons for existence

What is the reason behind the fact that a large share of the world tanker fleet is owned by independent owners?
Why is the share of the oil companies not larger?
The most important reason seems flexibility. The demand for oil is not merely subject to seasonal fluctuations, but it is also dependent on economic and political circumstances, as, for example, the present economic crisis and the 1973 Arab oil embargo. Because of the changing demand it is clear that the requirements of the oil companies with respect to tanker ton/miles are not constant. The fluctuations are difficult to predict.
In order to protect themselves against such undesirable fluctuations, the oil companies attempt to strike the correct balance between owned, long, medium and short-term chartered tonnage. Every oil company has a somewhat different concept as to future economic and political developments, and consequently their chartering policies differ. The existence of more appropriate capital investments can be another reason for not owning more tanker tonnage. Furthermore, the owning of vessels involves crewing, maintenance, insurance, etc. It may be considered advantageous to leave such matters to independent operators.

Chartering

Some understanding of the operation of the charter-market is required in order to appreciate the arguments which are put forward later on. Special attention should be paid to short term charters and spot fixtures.
The charter-market operates along the following lines:

In times of economic boom, with a related high demand for oil and tanker ton/miles, the level of spot charters is drastically reduced. The reason for this reduction is that under such conditions the capacity of the world tanker fleet is fully utilized. Most of the independently-owned tonnage will then be operating under longer term time charters.
In times of economic slump, the reverse occurs. More and more tonnage becomes available on the spot market as existing time charters expire. Under such circumstances, the oil companies are not prepared to commit themselves to long term agreements and therefore fulfil most of their requirements by means of spot fixtures.
From the above, it should be clear that, in general, the independent owners carry the economic burden of such surplus tonnage. The following example should illustrate this point.
On the 1st August, 1977, the world tanker fleet consisted of 325 million dwt of which:

60.3% was independently owned (196 m. dwt.)
21.2% was owned by the seven majors (69 m. dwt.)
18.5% was owned by other oil companies (60 m. dwt.)

97 million dwt of independently-owned tonnage was chartered to oil companies for periods of three months and longer. This represented about 50% of total independent tonnage. From the remaining 50%, approximately 30% was operating on the spot market and the other 20% was laid up.
The situation in 1973 is in marked contrast to the above. At this time only about 8% of world tanker deadweight (and mainly independently-owned tonnage) was operating on the spot market with virtually no tankers laid up.

The next Table clearly shows that the percentage of independently-owned chartered tonnage is not distributed uniformly among the various size groups.

Table 2. Independently owned chartered tonnage in various size groups.

date/ dwt × 10^3	10–19.9	20–29.9	30–49.9	50–69.9	70–124.9	125–174.9	175–224.9	225+
July 1977	———	16%	———	23%	38%	41%	70%	67%
June 1976	20%	36%	27%	37%	52%	50%	90%	74%
June 1975	26%	36%	36%	39%	57%	53%	83%	77%

Two of the deductions which can be drawn from Table 2 are relevant to this study:

i. the percentage of smaller tankers operating on the spot market is considerably larger than the percentage of larger tankers.
ii. the percentage of time charters, in relation to spot charters is decreasing. This phenomenon is obviously a result of the present situation in the world tanker market.

The fact that a greater proportion of larger tankers operates under time charters can be explained by the limited operational flexibility of such tankers VLCC's and ULCC's in particular are extremely limited in their operational capabilities and can not easily be switched to different routes.

Another important consideration is the age of tankers. A great many smaller tankers have reached the end of their operational life and are clearly unsuitable for long-term charter commitments. It is, therefore, not surprising to see this type of tanker dominating the short-term charter and spot market.

3 The identification of sub-standard tankers

Assumptions

The above brief account of some of the operational aspects of the tanker market, makes it possible to state some reasonable assumptions. The purpose of the assumptions is to narrow down the field of research and to give a first indication of those areas within the tanker market in which sub-standard tankers are likely to operate. Wherever possible the assumptions will be substantiated with suitable proof.

1. Sub-standard tankers will not be found among oil company-owned tonnage.
2. Sub-standard tankers will not be found among long-term chartered tonnage.
3. Sub-standard tankers will, generally speaking, not be found among larger tonnage. A border-line can, perhaps, be drawn at around 60,000 GRT.
4. Sub-standard tankers will, in general, be found amongst older tankers which have reached the end of their operational life.

Assumption (1) will be substantiated with suitable evidence later on.
Assumption (2) follows on logically from assumption (1) since vessels with long-term charters are usually relatively modern. Such vessels have to integrate effectively in the transport system of the oil company concerned. The vessels have to be efficient and reliable. There is clearly no place for the inefficiencies inherent in sub-standard tanker operations. Examples are engineroom breakdowns, cargo contamination, high accident rates, etc. In addition, longer term charter arrangements usually involve a more direct link between the contractual parties, both during and after negotiations. This does not apply to voyage and short-term charters, where the negotiations are conducted almost exclusively with a broker as intermediary. The result is that with long-term time charters the oil companies have a more intimate knowledge with respect to the management style and level of the shipowner concerned.
Assumptions (3) and (4) are also connected.
The reason for this is simply that larger tankers are relatively new. Furthermore, modern vessels require high capital investments. Most of the finance required is supplied by loan capital.
Before ship-mortgage banks or other financial institutions decide to provide the loans requested, a thorough investigation is carried out with regard to management level, financial and operational status of the shipowner, his

market prospects, etc. Similarly this applies to the acquisition of second-hand tonnage.

Sub-standard operators will in general not be amongst the owners who can, or are willing to, supply the required collateral for the acquisition of modern tonnage.

4 Casualty investigation

The following information has been derived from information provided in the Casualty Returns of the Liverpool Underwriters' Association. The years 1972 to 1976 inclusive have been studied.

Table 3. Serious tanker incidents 1972–1976 inclusive (> 6,000 GRT).

year	no. of accidents	no. of deaths	no. of pollution cases
1972	58	208	11
1973	49	49	10
1974	55	71	12
1975	64	84	12
1976	46	78	8
total	272	490	53

All the incidents selected were serious and caused major damage to the vessel. The word "serious" in this context is taken to mean that the vessel was unable to continue the voyage. In the majority of cases the damage sustained was such that the vessel was declared an actual or constructive total loss.

Table 4. Accidents recorded per flag as a percentage of total no. of accidents per year.

year/flag	Li	Pa	Gr	Br	Cy	Am	It	No	Ko	Ja
1972	29.3	7	12	5.1	5.1	8.6	5.1	7	2	–
1973	41	6	4	10	6	–	6	4	2	–
1974	29	3.6	25.5	5.5	5.5	7	3.6	2	2	3.6
1975	25	6	22	12.5	6	–	2	2	–	9
1976	37	6.5	11	4	2	13	–	2	–	2
average	32.3	5.8	14.9	7.4	4.9	5.7	3.4	3.4	1.2	2.9

Table 4 gives an indication of the relationship between the incidents and the flag of registration.

A next, and perhaps more appropriate step, will be to compare the number of incidents which have occurred under a particular flag with the size of the tanker fleet under that flag.

The result can be seen in Table 5.

Table 3, 4 and 5 together give an idea of the overall accident problem.

Table 3 shows the actual number of incidents.

Table 4 shows the concentration of these incidents with respect to flag of registration.

Table 5 gives a further indication as to whether the percentages given in

Table 5. % incidents per flag / % world tanker fleet (> 10,000 dwt) under flag (in no. of tankers).

year/flag	Li	Pa	Gr	Br	Cy	Am	It	No	Ko	Ja
1972	1.12	1.43	1.67	.45	7.3	.89	1.59	.84	7.4	–
1973	1.60	1.22	.48	.91	6.0	–	1.88	.56	6.9	–
1974	1.11	.77	3.10	.50	5.5	1.84	1.16	.30	6.7	.60
1975	.87	1.43	2.65	1.29	8.2	–	.71	.31	–	1.40
1976	1.22	1.55	1.39	.48	3.45	1.62	–	.30	–	.32
average	1.44	1.28	1.86	.73	6.10	.67	1.07	.46	4.2	.46

Table 4 are in any way alarming, given the size of the tanker fleet under the flag in question. In Table 5 the figure (1) would, of course, represent the world average.

The impression gained so far indicates an above average contribution of Liberia, Panama, Greece, Cyprus and South Korea. Italy also stood out during the years 1972 and 1973, but given the improved performance in the following years and the low percentage in relation to the total number of incidents, it was decided not to investigate this flag any further. The same can be said for South Korea.
The persistently high figures of the remaining four flags, which together account for more than 58% of the total number of incidents, warrant further investigation in this direction.
First of all, however, it is necessary to determine whether there are any particular trends as to size, age, type of accident, etc. with regard to the five year period investigated.

Table 6 clearly shows that approximately 70% of the accidents recorded involved tankers of less than 30,000 GRT. The 11–20,000 tons size group is particularly significant on account of its 48.9% share.

Table 6. Incidents according to size-group as a percentage of total number of annual incidents.

year/GRT $\times 10^3$	6–10	11–20	21–30	31–50	51–100	100+
1972	8.6	55.0	10.3	15.5	8.6	1.7
1973	12.2	42.8	20.4	18.3	6.1	2.0
1974	5.5	58.2	10.9	14.5	10.9	–
1975	7.8	40.6	10.9	14.1	15.6	10.9
1976	6.5	47.8	8.7	17.4	10.8	8.7
average	8.12	48.9	12.24	15.96	10.4	4.7

The above percentages are not necessarily indicative of the accident intensity for each size-group. To achieve a more representative figure, it is necessary to take into account the number of tankers in each size group. The emphasis

should be on the number of tankers in each size group, rather than on a percentage of the total world deadweight or gross-registered tonnage. These last two forms are usually found in shipping statistics, but are clearly unsuitable in accident investigations.

Table 7. % accidents in size group / % of tankers in size group (> 10,000 dwt).

year/GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
1972	.78	1.33	.77	.87	1.06	.20
1973	1.17	1.07	1.59	1.03	.73	.19
1974	.60	1.53	.89	.82	1.18	–
1975	.88	1.14	.94	.80	1.56	.66
1976	.76	1.45	.82	.99	.95	.46
average	.84	1.3	1.0	.90	1.1	.30

Table 7 again focusses attention on the 11–20,000 ton size-group. Figures for the 51–100,000 tons size groups are also above average although this group only accounts for 10% of the accidents investigated. The next step will be to examine the age-distribution of the tankers involved.

Table 8. Incidents according to age-group as a percentage of total number of annual incidents.

year/age	0–5	6–10	11–15	16–20	21–25	26–30	31+
1972	18.9	8.6	8.6	44.8	10.3	8.6	–
1973	12.0	10.0	24.5	26.5	16.0	10.0	2.0
1974	9.0	18.0	13.0	34.5	20.0	1.8	3.6
1975	22.0	22.0	12.5	33.0	9.0	–	1.5
1976	22.0	9.0	13.0	33.0	17.0	2.2	4.3
average	16.8	13.5	14.3	34.4	14.5	4.5	2.3

Table 8 seems to indicate that the figures for the 16–20 year age – range are above average. It will again be necessary to consider the total number of tankers in each age-group.

Table 9. % accidents in age-group / % no. of tankers in age-group.

year/age	0–5	6–10	11–15	16–20	21–25	26–30	30+
1972	.95	.44	.34	2.04	1.27	1.62	
1973	.55	.49	1.06	1.14	2.39	2.55	
1974	.34	.93	.61	1.59	2.32	1.80	
1975	.76	1.16	.67	1.55	1.01	.44	
1976	.67	.48	.72	1.76	1.95	2.03	
average	.65	.70	.68	1.62	1.79	1.69	

The results obtained in Table 7 are hardly surprising. If one takes into account the number of tankers in the world tanker fleet for each age-group, the

tankers of 16 years and over give a high accident percentage in relation to the world average.

Synopsis of chapter 4

1. The incidence of accidents recorded under the flags of Liberia, Panama, Greece and Cyprus is above the world average. Together they account for approximately 58% of the total number of accidents recorded.
2. Approximately 70% of the incidents recorded involved vessels of between 6 to 30,000 GRT. Owing to its 48,9% share, the 11–20,000 tons size-group stands out.
3. Approximately 56% of the incidents recorded involved vessels of 16 years and over. The 16 to 20 years age-group, with a 24,5% share, also stood out.

5 Casualties and reasons

Subdivision of the registered incidents into types of accident for the 5-year period under investigation, should provide some insight into the underlying reasons for these accidents.
The following subdivision has been used:

Type of accident	*Abbreviation used*
1. Engineroom (fire, explosion, serious mechanical damage)	ER
2. Collision	CL
3. Stranding	ST
4. Explosion/fire (other than in engineroom)	EF
5. Structural failure	SF
6. Other (heavy weather damage, ice damage, vessel missing, etc.)	Or

Table 10. Type of accident as a % of total number of annual accidents.

year/type of accident	ER	CL	ST	EF	SF	Or
1972	22	17	22	26	10	3
1973	16	26	32	14	6	6
1974	29	25.5	25.5	14	2	3.5
1975	22	28	31.5	6	9.5	3
1976	30.5	11	39	6.5	9	4
average	23.9	21.5	30	13.3	7.3	3.9

Table 10 should be studied in the light of the results obtained previously. After reading and analysing the incident reports, it became clear that a great many accidents occur through human operational errors of some description. In the case of tanker accidents, this human failure can be linked to the management policy of a company. That this is the case can perhaps be more fully appreciated when one realizes that a shipowner/manager is largely responsible for the quality of the crew on board of his vessel(s).
Taking into account the flag, age and size distribution identified previously, Table 10 therefore gives some implied indications as regard accident causes (type).
It would appear that approximately 75% of incidents recorded occurred on account of human operating errors. These implied indications are further strengthened by another Netherlands Maritime Institute-study called "Maritime Risk Analysis of the importation of LNG into the Netherlands",

dated January, 1976, the results of which point to an even higher contribution of human operational errors in the incident occurrences analysed.
Other studies at present undertaken within this institute point to similar results.
In spite of these similar conclusions, the statement given above concerning the influence of human operating errors must be substantiated with further evidence.
For the statement to be true the proportion of accidents involving human operating errors i.e. stranding, engineroom, etc., and, resulting from flags previously identified, must be shown to be above the world average. The reason for this is that the flags of Greece, Liberia, Cyprus and Panama are usually associated with lack of control with respect to qualifications and certification. Consequently substandard tanker operators will turn to such flags for registration of their vessels. The results of further investigation are shown in the following Table.

Table 11. % no. of accidents per flag / % no. of tankers per flag (> 6,000 GRT).

flag/type of accident	ER	ST	EF	SF	CL	Or
Gr	2.38	2.17	1.56	1.70	.58	3.70
Li	1.48	1.21	1.22	.60	1.73	.79
Pa	1.83	1.59	1.08	2.92	.33	1.26
Cy	6.35	1.30	7.90	7.10	4.90	12.50
other flags	.49	.70	.72	.80	.76	.50

Table 11 clearly shows that in comparison with "Other flags", the flags of Greece, Liberia, Panama and Cyprus have an above average proportion of the type of accidents normally involving human operating errors. Engineroom damage, for instance, compares unfavourably with the average world ratio of "1" and worse still with the figure of .49 achieved by "Other flags". The same applies to "stranding". Also "Explosions and Fires" other than in the engineroom, occur more frequently under the four identified flags. The low figure of .60 for "Structural Failures" which occurred under the Liberian flag, is probably due to the moderating effect of the relatively modern fleet operating under this flag.
The figures given under the heading "Collision" are not considered representative indicators of sub-standard management and crew.
The reason is that collision cases involve two or more ships, i.e. external influences intervence.
Finally there is the column "Others" i.e. heavy weather damage, ice damage, vessel missing etc. Greece and Cyprus are particularly significant in this respect.
All vessels involved in accidents during the observation period were properly classified with reputable classification societies, although this does not imply that the ships were necessarily seaworthy, with respect to hull and machinery

at the material time (page 59). In general it can, however, be said that the impression gained previously is further substantiated. It appears that the accidents pattern observed is indeed largely due to human operating errors, which in turn can partly be blamed on management policies.

Since it is difficult to come by evidence with respect to sub-standard management and crew, an attempt will be made to find some form of indirect proof. One way would be to show that the accident involvement of tankers owned by oil companies was much lower, the reason being that oil company-owned vessels were properly managed and manned.

Table 12. % no. of accidents per group / % no. of tankers per group (1972–1976 incl). (> 6,000 GRT).

year/group	independents	seven majors and other oil co's
1972	1.50	.18
1973	1.38	.37
1974	1.54	.15
1975	1.62	.07
1976	1.52	.23
average	1.51	.20

Table 12 gives a clear indication of the proportion of accidents occurring with independently-owned tankers considered as one group and oil company-owned tankers considered as another group. Given the fact that the world average figure is "1", assumption one one page 21 can be substantiated. The proportion of incidents occurring in oil company-owned vessels in relation to the total number of accidents is indeed low.
It should be understood that the term "oil company-owned" tonnage includes vessels under the Liberian, Panamanian, Korean flag, etc. Examples of such tonnage are Gulf Oil Corporation with its subsidiary Afran Transport Company in Liberia, owning 17 tankers; the Sam Hwa Transport Company Ltd. in Korea with 2 tankers, etc. Exxon Corporation, for instance, owns the Esso Transport Company Inc. in Panama, which has 26 tankers. Many more similar examples can be given.

Table 1 on page 14 shows that the low incidence of accidents occurring with oil company-owned vessels is even more striking in view of the fact that the oil companies own relatively more vessels in the size group of 30,000 GRT and less. They own about 60% of the total number of tankers in that group. Of course the question could be asked whether there is any difference in the age and size distribution of oil company-owned tonnage in relation to that of the world total.
Table 13, 14, 15 and 16 give an answer to this question. The situation depicted is that of the beginning of 1975.

Table 13. The seven Majors – Distribution of tonnage owned wrt* size, expressed in percentages of no. of tankers for each company (1975).

company/GRT $\times 10^3$	6–10	11–20	21–30	31–50	51–100	100+
BP	–	49.5	14	15	2	19
Exxon	3.2	34	20	16.3	7	19
Gulf	–	48.3	25	3.3	5	18.3
Mobil	–	41.1	10	19.6	9.8	19.6
Shell	2.5	41.6	11.4	18	5	22
Standard Oil	7	23.7	11.3	22.7	7	28
Texaco	–	49.5	21	10.5	1	17.6
average	1.8	41.1	15.1	15.1	5.3	20.5

* For abbreviations used, see page 2.

Table 13 shows that the greatest concentration of oil company-owned tonnage with respect to size, lies with the 11–20,000 GRT group.

Table 14. Other oil companies – size distribution of tankers owned expressed as a % of no. of tankers.

GRT $\times 10^3$	6–10	11–20	21–30	31–50	51–100	100+
%	14	25	22	18	13	8

Table 14 gives an indication of the distribution of *other* oil company-owned tonnage with respect to size. The oil companies considered were Atlantic Richfield, Hess, Getty, Phillips, Sun Oil, Union Oil, Burmah, Tokyo Tankers K.K. and Petroles Brasileiro S.A.
The greatest concentration of tankers was also found to be within the 11–20,000 GRT group, but this concentration is less marked than with the Seven Majors.

Table 15. The Seven Majors – age distribution (as a % of no. of tankers of each company).

company/age in years	0–5	6–10	11–15	16–20	21–25	26+
BP	35	22	27	15	1	–
Exxon	34	20.6	19.5	19	6	.5
Gulf	20	13.3	28.3	23.3	1.7	13.5
Mobil	41	8	27.4	17.6	6	–
Shell	22	22	12.4	34.6	9.0	–
Standard	43.3	11.3	13.4	6.2	9.3	16.5
Texaco	14	15.3	22.3	23.5	6	19
average	29.9	16.1	21.5	19.9	5.6	7
world average	26.1	19.3	21.3	21.7	8.6	3

The main conclusion to be drawn form the information given in Table 1 and 12 to 16, is that oil company vessels do indeed operate more safely than those of independent operators. The ratio of .20 stated in table 12 with

Table 16. Other oil companies – age distribution (as a % of no. of tankers).

age	0–5	6–10	11–15	16–20	21–25	26+
other oil companies	23.0	12.0	26.4	21.5	9.0	8.1
world average	26.1	19.3	21.3	21.3	8.6	3.0

respect to oil company-owned vessels as opposed to 1.51 for independently owned vessels speaks for itself.

The oil companies' proportion of vessels of 11 years and more and under 30,000 GRT, which are identified as accident prone, is by no means smaller. In fact, the majors own relatively more vessels in the 11–20,000 GRT group, i.e. 49.5% as opposed to the world average of 41.1%. As far as age distribution is concerned, the tonnage owned by the oil majors is close to the world average. The tonnage owned by the selected oil companies tends to be above average, i.e. their tankers tend to be older. This is a further indication that age is not necessarily related to an increased accident risk, but rather tha quality of management and/or crew is of greater importance.

Summary of chapter 5

1. The influence of human operating errors in the incidence of tanker accidents is a major one.
2. There are indications that certain section of the tanker fleet of Liberia, Greece, Panama and Cyprus sail with sub-standard crews, probably as a result of poor management or inferior management policy.
3. The oil companies' incidence in the total number of recorded accidents is extremely low.

6 Some further indications of sub-standard tanker operations

In the light of the previously stated results, it can be said that the area of investigation has been narrowed down substantially. It is important now to concentrate on the flags of Liberia, Panama, Cyprus and Greece.
Special attention will have to be paid to the tonnage range of 6–30,000 GRT and vessels of 11-years and older.
Previous conclusions indicate that there is no further need to consider oil company-owned tonnage under the four flags mentioned above.
It is a well known fact that three out of the four identified flags are designated "flags of convenience". Greece is sometimes referred to as a "quasi flag of convenience".
Given the main characteristic of a flag of convenience, i.e. the country of registry allows ownership and/or control of its merchant vessels by non-citizens, it will be necessary to give some indication of the "real" ownership/management of the vessels under the flag in question.
Before taking such a step, however, it is considered necessary to give a further analysis with respect to size and age for each of the flags identified. First of all, the Greek tanker fleet will be examined.

The Greek tanker fleet (> 6,000 GRT, 1975)

Table 17. Size groups as a % of no. of tankers in the Greek tanker fleet.

GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
% of tanker fleet	6	48.4	16.3	19.5	6.6	3.5
world average	9.2	38	12.3	17.6	9.2	13.6

Table 18. Age groups as a % of no. of tankers in the Greek tanker fleet. (320 vessels > 6,000 GRT).

age (years)	0–5	6–10	11–15	16–20	21–25	26+
% of tanker fleet	15.7	14.2	19.2	37.4	12.6	1.0
world average	26.1	19.3	21.3	21.7	8.6	3.0

Table 17 shows that 70.3% of the Greek tanker fleet (number of tankers) is less than 30,000 GRT. The size-group of 11–20,000 GRT stands out with a share of 48.8%. This size-group is, of course, the previously indicated "accident prone" group.
When age is considered, similar results are obtained and the accident prone age-group of 16–20 years stands out with a share of 37.4%.
Next the accidents recorded involving Greek flag tankers will be analysed

Table 19. % no. of accidents in group as compared with % no. of tankers in group (> 6,000 GRT, 1975).

GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
% no. of accidents in group	12.0	50.0	14.3	16.7	5.5	2.0
% no. of tankers in group	6.0	48.4	16.3	19.5	6.6	3.5

Table 20. % no. of accidents in group as compared with % no. of tankers in group

age	0–5	6–10	11–15	16–20	21–25	26+
% no. of accidents in group	12.0	16.7	16.7	31.0	21.5	2.1
% no. of tankers in group	15.7	14.2	19.1	37.4	12.6	1.0

according to size and age-groups and compared with the distribution of Greek tanker tonnage in the same age and size-groups.

Tables 19 and 20 seem to give no clear indication as to the responsibility of any particular group for the high accident rates incurred. It is only the size-group of 6–10,000 GRT which stands out, with a share in the total number of tankers under the Greek flag of 6%, but with a 12% share in the total number of accidents recorded under this flag.

The conclusion can therefore be drawn that no clear relationship exists between age, size and recorded incidents in the various groups. It follows that the high accident rate of 1.86 shown in Table 5, page 24, must be the result of a common factor which is applicable to the Greek tanker fleet as a whole. The only two factors which could be considered in the circumstances are crew and management.

From the facts in Table 11, page 28, the inevitable conclusion is that a large proportion of the accidents recorded under the Greek flag were basically caused by the existence of sub-standard crew and management.

An estimate of the number of sub-standard tankers under the Greek flag

In the light of the points mentioned above, it is extremely difficult to give an accurate estimate of the number of sub-standard tankers under the Greek flag. In view of the purpose of this investigation a concrete figure must however be specified.

The following facts were taken into account in arriving at the stated figure:

i. 70% of the Greek tanker fleet consists of vessels of 30,000 GRT or less (> 6,000 GRT)
ii. 51% of the Greek tanker fleet is older than 16 years of age
iii. the type of accidents (Table 11, page 28)

iv. the fact that Greek owners with relatively modern tonnage, such as Niarchos, C. M. Lemos, Onassis, Stavros, Livanos, operate mainly under the Liberian flag
v. modern Greek tonnage, such as the fleet owned by Michaial A. Koragеorgis
vi. the operational comparison of the Greek-owned tanker fleet with the oil company-owned tanker fleet (Chapter 6).

Given the above facts the estimate of the number of sub-standard tankers under the Greek flag is in the region of 175 vessels (out of a total of 320 Greek flag tankers (> 6,000 GRT).

The Liberian tanker fleet (> 600 GRT, 1975)

Table 21. The Liberian tanker fleet in size-groups as a % of no. of vessels.

GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
Liberian tanker fleet	3.5	24.0	18.5	20.7	16.0	17.3
world average	9.2	38.0	12.3	17.6	9.2	13.6

Table 22. The Liberian tanker fleet in age-groups as a % of no. of vessels.

age (years)	0–5	6–10	11–15	16–20	21–25	26+
Liberian tanker fleet	39.0	17.5	15.0	23.0	5.5	.4
world average	26.1	19.3	21.3	21.7	8.6	3.0

Table 21 shows that the Liberian tanker fleet has a relatively high number of large vessels. The size-group of 20,000 GRT and less, is represented by 27.5% as compared with the average world figure of 47.2%. All other size-groups, i.e. 21–30, 31–50, 51–100 and 100+ GRT, are all above the average world percentage.
As far as age-groups is concerned, the Liberian tanker fleet is clearly a modern fleet. The age-group of 0–5 years is represented by a 39% share, which is considerably above the average world figure of 26.1%.
The age-groups from 6–10, 11–15, 21–25 and 26+ years, are all below the average world figure stated. It is even more striking that the age-group from 16–20 years is higher than the average world percentage. This age-group was responsible for 34.4% of the total number of accidents recorded.

Table 23. % no. of accidents in group as compared with % no. of tankers in group.

GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
% no. of accidents	4.6	46.5	20.0	15.0	11.6	2.3
% no. of tankers in group	3.5	24	18.5	20.7	16.0	17.3

Table 24. % of no. of accidents in group as compared with % no. of tankers in group.

age (years)	0–5	6–10	11–15	16–20	21–25	26+
% no. of accidents in group	11.6	15.0	8.1	43.2	18.6	3.5
% no. of tankers in group	39.1	17.0	15.0	23.0	5.5	.4

The figures given in Table 23 and 24 speak for themselves. It is remarkable tot see that the size-group from 11–20,000 GRT represents 24% of the Liberian tanker fleet and yet is responsible for 46.5% of the recorded incidents. Similarly, it is striking that the age-groups from 16 years and older make up 29% of the Liberian tanker tonnage, but yet they account for 65.3% of the recorded accidents with tankers under the Liberian flag. These facts show clearly the area on which the Liberian Bureau of Maritime Affairs should concentrate its attention.

A next important step will be to identify the ultimate responsibility with respect to ownership and/or management of Liberian tankers of 11–20,000 GRT and/or 16 years and older.

In the tanker market it is common practice to establish "one-ship Ltd. companies". It is relatively simple to trace the ultimate ownership of some of these companies. For others, however, it is impossible to do so. Despite certain difficulties, the following results were obtained:

262 Liberian tankers of 30,000 GRT and less and 16 years of age and over were indentified (> 6,000 GRT); 45% of which are owned and/or managed by Greek nationals. The main operational centres of these Greek nationals are Piraeus, London and New York. A further 20% of the identified vessels are managed from New York by American owners and/or managers. The remaining 35% is accounted for by British, Scandinavian, Indonesian, Hong Kong and other unknown operators.

A further analysis of accidents involving Liberian tankers establishes that 37.6% of such accidents took place with Greek owned/managed tonnage, 27% with American owned/managed tonnage, 7% with Hong Kong tonnage and 4.7% with oil company-owned tonnage. The remaining 23.7% involved tonnage, the ownership of which could not be traced.

Conclusion

The fact that:

a. 262 tankers of the Liberian tanker fleet are less than 30,000 GRT and 16 years and over;
b. the 11–20,000 GRT group accounts for 46.5% of the total number of accidents recorded under the Liberian flag;
c. the ownership of the above groups,

leads to the conclusion that the number of sub-standard tankers under the Liberian flag is between 150–200.

The Cypriot flag

Table 25. Size distribution as a % of no. of tankers in the Cypriot fleet (28 vessels > 6,000 GRT).

GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
Cypriot tanker fleet	18.0	71.5	10.5	–	–	–

Table 26. Age distribution as % of no. of tankers in the Cypriot fleet.

age (years)	0–5	6–10	11–15	16–20	21–25	26+
Cypriot tanker fleet	–	–	18	50	32	–

The percentages given in Table 25 and 26 speak for themselves.
The size-group of 11–20,000 GRT and the age-group of 16 years and more represent 71.5% and 82% of the Cypriot tanker fleet respectively. Investigation shows that the real ownership of at least 60% of Cypriot tankers is in the hands of Greek nationals.
Further accident analysis indicates that 92% of accidents with Cypriot flag tankers occurred with Greek managed tonnage.

Given the above facts the number of sub-standard tankers under the Cypriot flag can be estimated at approximately 20 vessels or 71% of the total Cypriot tanker fleet.

The Panamanian flag

Table 27. Size distribution as compared with accident distribution.

GRT × 10^3	6–10	11–20	21–30	31–50	51–100	100+
% no. of Pan. flag	8.0	39.0	24.4	15.0	4.2	9.4
% no. of accidents	23.5	53.0	17.5	6.0	–	–

Table 28. Age distribution as compared with accident distribution.

age (years)	0–5	6–10	11–15	16–20	21–25	26+
% no. of Pan. tanker fleet	17.5	15.0	15.6	28.8	12	11
% no. of accidents	–	–	17.5	17.5	23.5	41.5

Table 27 shows that also under the Panamanian flag the 11–20,000 GRT groups stands out, i.e. it represents 39% of the number of tankers, but is responsible for 53% of the number of accidents.

As far as the age-accident relationship is concerned, Table 28 shows a bias towards older tonnage. The age-group of 21 years and over represents 23% of the Panamanian tanker fleet but causes 65% of the number of accidents. Some further analysis of the Panamanian tanker fleet shows that there are 88 tankers of both 16 years and over and less than 30,000 GRT. 36 of these 88 vessels are oil company-owned (Texaco and Esso). From the remaining 52 vessels, 17% are Greek owned, 25% American owned, 10% Hong Kong owned and the remaining 48% belong to unidentified owners.

Again it will be necessary to give an estimate of the number of sub-standard tankers under the Panamanian flag. This figure lies between 30 to 50 sub-standard tankers. In identifying such vessels, special emphasis should be laid on the size-group of 20,000 GRT and less with a age of 21 years or over.

Finally it is noteworthy that 31% of the Panamanian tankers involved in accidents were American-owned, 13% Hong Kong owned, 6% Greek owned and that the remaining 44% could not be identified.
Given the oil companies' considerable share in the "accident prone" size and age-groups, it is remarkable that the oil companies have no share in the accident occurrence. This seems a further confirmation of the belief that the level of management and crew is of far greater importance than age or size of the vessel.

Estimate of the total number of sub-standard tankers in the world tanker fleet

The information collected at this stage of the investigation makes it possible to make an estimate of the total number of sub-standard tankers in the world tanker fleet.
Taking into account the flags of Singapore, South Korea, Somalia, as well as the flags mentioned previously, we estimate 13–15% of the total number of tankers (> 6,000 GRT) in the world tanker fleet to be sub-standard. In actual figures this means about 450 tankers. The word "sub-standard" does not necessarily relate to structural deficiencies although a ship can be sub-standard through such deficiencies.
This investigation, however, suggests that it is sub-standard management and crew which is the main cause of sub-standard operations.

7 A Greek tanker operator as compared with a large oil company

The following comparison between the tanker fleet accident patterns of a well known Greek tanker operator, operating under Greek flag, and a large oil company, operating under British flag, serves to further strengthen the opinion expressed on page 33, concerning the level of management and crew of Greek vessels (and probably Greek-owned vessels under other flags). In order to achieve a reasonable comparison between the two operators, 37 oil company-owned vessels were selected. The selected vessels conformed as closely as possible to the age, size and trading distribution of the independent owner.

The year 1973 was selected in order to eliminate the possible effects of the Arab-Israeli war and the ensuing oil embargo.

The following incidents were reported in the 1973 editions of Lloyd's List as far as the two fleets are concerned:

Large oil company: 37 selected tankers (incidents reported in Lloyd's List, 1973)

1. Vessel A – 1958 – 27,114 GRT
   July 1973 engineroom black-out – forced anchorage – no damage
2. Vessel B – 1962 – 32,128 GRT
   August 1973 main cargo pumproom explosion. Minor damage.
3. Vessel C – 1960 – 22,741 GRT
   October 1973 stranded off Bosporus – hard aground – refloated after three days. No apparent damage.
4. Vessel D – 1963 – 30,815 GRT
   May 1973 both steering engines burnt out.
5. Vessel E – 1964 – 43,093 GRT
   October 1973 vessel disabled – repaired same day.
6. Vessel F – 1964 – 13,252 GRT
   May 1973 complete engine failure. No delay involved.
   December 1973 collision – holed between Nos. 9 and 10 port and leaked spirit (50 tons).
7. Vessel G – 1969 – 15,260 GRT
   July 1973 fire in economiser waste-heat unit.
8. Vessel H – 1962 – 27,045 GRT
   – 1973 voyage interrupted in order to effect repairs to overboard discharge valve.
9. Vessel I – 1959 – 32,187 GRT
   October 1973 grounded off Thames estuary – refloated. No apparent damage.

Greek tanker operator: 37 tankers (incidents stated in Lloyd's List, 1973)

1. Vessel 1 – 1954 – 28,198 DWT

March 1973	new engine installed at Cape Town.
April 1973	grounded are refloated using own power.
May 1973	port boiler roof tubes to be renewed, super heater + economizer to be repaired, starboard boiler all roof tubes to be renewed, main engine requires overhaul, auxiliary engines vibrating badly and need to be repaired, oil coolers blocked, main circulating pump overheated and burned, feed pumps seized.
June 1973	towed to Singapore for repairs.
July 1973	owners allege that boiler damage, consisting of heavy scaling of tubes and tube overheating due to efforts to refloat at time of grounding in April.

2. Vessel 2 – 1966 – 38,624 GRT

December 1973	surveyed in respect of alleged crew negligence and grounding and subsequent heavy weather damage in August. Port diesel generator heavily damaged. Main engine chocks hammered into tanktop, tie bolts slack, cylinder blocks moving, all cross head bearings broken, main engine and bedplate deflections abnormal.

3. Vessel 3 – 1966 – 71,087 GRT

May 1973	vessel surveyed in respect of grounding in April. Vessel refloated using own power. Vessel dry-docked – three quarters of bottom paint removed to bare metal, simplex outer ring heavily leaking – main engine damage through excessive overheating and vibrations. Most pistons, valves, cylinder liners, cross head bearings, etc. renewed and/or overhauled.

4. Vessel 4 – 1964 – 52,868 GRT

November 1973	on loaded voyage boilers overheated. Tubes in both boilers sagged and leaking, generator crank shaft broken, due to failure of oil supply.
December 1973	Grounded – main engine overheated through refloating efforts – during drydocking discovered heavy weather damage, i.e. 50 cracks in internal central oil tank structure as well as minor deck damage.

5. Vessel 5 – 1956 – 20,855 GRT

March 1973	Heavy weather damage and grounding damage.
July 1973	Serious oil contamination in boilers with subsequent damage to furnaces.

6. Vessel 6 – 1966 – 38,616 GRT
   February 1973 Grounded and refloated using own engines – subsequent repairs took two months.
   September 1973 Main engine thrust failure – repairs affected took ten days.

7. Vessel 7 – 1966 – 78,785 GRT
   November 1973 Surveyed in respect of damage alleged sustained, due to grounding and heavy weather damage – permanent repairs carried out.

8. Vessel 8 – 1965 – 25,476 GRT
   February 1973 Turbo generator damage – complete turbine unit to remove ashore for repair.
   April 1973 Heavy weather damage, 20 cracks found.
   June 1973 Grounded – no. 4 port cargo tank shell plates pierced and indented, sea grids and coolers choked, – scavange fire occurred, damaging piston rings and explosion in port boiler damaged tubes.

9. Vessel 9 – 1965 – 32,060 GRT
   February 1973 Heavy weather damage, deck damage and 20 cracks in cargo tanks.
   October 1973 Heavy weather damage, holding down bolts and tie rods found loose and crankshaft deflection.

10. Vessel 10 – 1957 – 21,185 GRT
    February 1973 Heavy weather damages – Shell plates set in and strake buckled.

11. Vessel 11 – 1965 – 37,469 GRT
    June 1973 Contact with steel mooring dolphin – heavily dislodged and constituting danger to other vessels.

12. Vessel 12 – 1962 – 31,050 GRT
    January 1973 Extensive main engine damage in way of exhaust valves – cross head bearings, feed pumps and turbo chargers.

13. Vessel 13 – 1961 – 28,917 GRT
    November 1972 Aground due to engine breakdown – engineroom and pumproom flooded. Vessel sailed finally in June 1973 after extensive repairs.

14. Vessel 14 – 1965 – 42,109 GRT
    February 1973 funnel fire.

15. Vessel 15 – 1952 – 15, 848 GRT
    January 1973 Heavy weather damage to cargo tanks heating coils.
    June 1973 Diesel generator damage, repair team boarded.

16. Vessel 16 – 1965 – 39,011 GRT

June 1973	Alleged crew's negligence – starboard generator bottom end bearings broken and rough – cooling water spaces dirty and scaled and five pistons cracked – turning gear casing and supports cracked – flywheel teeth broken, etc.

17. Vessel 17 – 1965 – 37,073 GRT

March 1973	Heavy weather damage.
October 1973	Boiler damage due to fire.
December 1970	Alleged crew's negligence – turbo-generator damage allegedly due to carry-over from boilers – sustained heavy damage.

18. Vessel 18 – 1956 – 22,992 DWT

June 1973	Soot fire in air heater and oil fire in furnace, alleged crew's negligence.
August 1973	Grounded, boiler generator tubes renew – air heater, waterwall, superheater pipes all renew; condenser, coolers, circulating pumps, etc., all repair, also cargo tank bulkhead fractures and heating coil leaks.
December 1973	Broke down and had to return to port.

19. Vessel 19 – 1965 – 62,400 DWT

July 1973	Main engine damage, allegedly due to crew negligence, cross-head bearings burnt – connecting rod bearings to be renewed, etc.

20. Vessel 20 – 1949 – 9004 GRT

March 1973	Grounded
April 1973	Heavy weather damage
May 1973	Collision
May 1973	Loss of port anchor with five and a half lengths of chain.

21. Vessel 21 – 1966 – 41,964 GRT

November 1973	Due to bad weather forced to unmoor and contacted mooring buoy which sank – five mooring wire lines broken – propeller fouled and four blades damaged.
December 1973	Engine trouble and rudder damage, salvage services accepted.

22. Vessel 22 – 1965 – 31,768 GRT

June 1973	First 30 days of January repairs carried out from previous grounding damage.

23. Vessel 23 – 1954 – 18,120 DWT

April 1973	Heavy weather damage, fractured shell plates and various other damages.

24. Vessel 24 – 1958 – 13,093 GRT

May 1973	Grounded, efforts to refloat damaged main engine.
June 1973	Ice damage – ten shell plates found indented.

25. Vessel 25 – 1954 – 19,053 DWT

October 1973	Port boiler completely burned out.
October 1973	Heavy weather damage.
December 1973	Starboard boiler heavy damage – allegedly due to overloading subsequent to port boiler damage.

26. Vessel 26 – 1958 – 13,186 GRT

September 1973	Heavy weather damage – engineroom pipe fractures, deck damage, etc.

27. Vessel 27 – 1960 – 41,982 GRT

January 1973	Fire in boiler room.
August 1973	Main boiler damage due to alleged crew negligence, vessel towed to Cape Town.
October 1973	Heavy weather damage.
November 1973	Touched bottom.

28. Vessel 28 – 1953 – 15,899 GRT

March 1973	Grounded, heavy and deep corrugation, pumped considerable amount of crude oil overboard.
May 1973	Heavy weather damage.

The previous comparison of the reported incidents involving the two fleets considered may appear unduly detailed. It was, however, decided that an analysis in terms of type of accident, etc. would not show the operational differences in an adequate way. Consequently it was considered more explanatory to quote (at least partly) the incident reports as stated in Lloyd's List. In this way the differences in operational level become self-evident. The 37 selected oil company-owned tankers were involved in 10 incidents the nature of which was in most cases relatively minor. The indicents resulted in little or no delay to the tankers concerned.

The independently-owned tanker fleet shows a completely different picture. From the 37 tankers present, 28 were involved in incidents. Several vessels were involved in more than one accident.
Incidents such as grounding, substantial main engine damage, heavy weather damage, etc. appear with great regularity. The phrase: "*allegedly due to crew's negligence*" can often be seen.
The resulting delay to the tanker concerned was in most cases considerable and amounted in some cases to six months.
Table 29 will further illustrate the operational differences between the two fleets.

Table 29. Greek tanker operator compared with large oil company (1973).

year 1973	Greek owner	oil company
No. of tankers	37	37
no. of accidents	28	10
nautical miles covered (estimated)	2,700.000	3,600.000
average n.m./tanker	73,000	97,000
days lost through accidents	1072	20
average no. of days lost/tanker	29	0.5
average/age	13 years	10 years
average/size	30,000 GRT	30,000 GRT

8 Some further examples of tanker incidents

The Argo Merchant case

The stranding of the Argo Merchant off Nantucket Island in December 1976 is a well-known case of oil pollution. As a result of the grounding and the subsequent breaking into two sections, 28,000 tons of fuel oil spilled into the sea.

The tanker had been built in 1953 and measured 18,743 GRT. In Lloyd's List of Shipowners the vessel is mentioned under Thebes Shipping Inc., a one ship company. Amership Agency Inc. in New York are quoted as managers. The names of the other one-ship companies listed under this agency make it clear that one is dealing with so called "New York" Greeks. The Argo Merchant was manned with Greek crew. During its 23 year operating life the vessel sailed under the following names/companies:

1953–1957: Arcturus for Fairplay Tanker Company in New York.
1957–1964: Arcturus for Fairplay Tanker Company in London.
1964–1968: Arcturus for Bootes S.A. in Monrovia and managed from Geneva.
1968–1970: Permina Samudra III for Bootes S.A. in Monrovia.
1970–1973: Vari for Vari Cia Mtmara in Monrovia (managed from New York).
1973–1976: Argo Merchant for Thebes Shipping Company in Monrovia (managed from New York).

The following accident data concerning the Argo Merchant (from 1964) has been compiled by Marine Management Systems Inc. in New York.

MARINE MANAGEMENT SYSTEMS, INC.
TANKER CASUALTY SYSTEM:

ARGO MERCHANT	DWT: 28238 PETRO. TANKER FLAG: GRE CLASS: AB MOTOR SHIP OWN: THEBES SHIPPING INC. (15060) DEL DATE: 0053 SHIP NO: 15022522 BLDR: 25311 HOWALDTSWERKE HAMBURG A.
0764 DAMAGE TO MACH:	PROPELLER CONE DAMAGED BULKING BLADES AND CRACKING PROPELLER SHAFT EFFECT: LAST UPDATE: 0764 NO EFFECTS LISTED
1264 DAMAGE TO MACH:	≠ 1 & 2 TURBO-GENERATORS OUT OF ORDER; BURNT SLIP RINGS, WORN BEARINGS, ETC. EFFECT: LAST UPDATE: 1264 NO EFFECTS LISTED

0865 DAMAGE TO MACH: FOUR DAYS DELAY CRISTOBAL UNDERGOING FEED PUMP REPAIRS. NO DETAILS GIVEN
EFFECT: LAST UPDATE: 0865
REMAINED IN PORT FOR REPAIRS

0467 COLL. IN UNRPTD AREA: SOMEWHERE IN JAPAN; ELEVEN BOW PLATES AND INTERNALS DAMAGED
EFFECT: LAST UPDATE: 0467
NO EFFECTS LISTED

0567 FIRE AND/OR EXPLOSION: RETURNING SINGAPORE: 3 BOILER FIRES, PROPELLER SHAFT LEAKAGE, ETC.
EFFECT LAST UPDATE: 0567
RETURNED TO PORT FOR REPAIRS
TOWED INTO PORT

0767 DAMAGE TO MACH: TOWED OSAKA; BOILER TUBES PLUGGED, TROUBLE WITH FEED PUMPS
EFFECT: LAST UPDATE: 0767
TOWED INTO PORT

0967 BLACKED OUT: DIVERTED HONOLULU; LOST FRESH H_2O DUE BOILER TROUBLE.
NEGLIGENCE SUSPECT:
EFFECT: LAST UPDATE: 0967
DIVERTED FOR REPAIRS

1267 OTHER CASUALTY: RETURNED HONOLULU; EXPERIENCED SOME MINOR ELECTRICAL DIFFICULTIES
EFFECT: LAST UPDATE: 1267
RETURNED TO PORT FOR REPAIRS

0568 HIT BUOY, DCK, STRUC: HIT QUAY MADRAS; EXTENSIVE INDENT STERN PLATING AND INTERNALS
EFFECT: LAST UPDATE: 0568
NO EFFECTS LISTED

0668 FLOODED ENG ROOM: AFTER BOILERS BROKE DOWN, ENGINE ROOM FLOODED, ELEC; EQUIP. DAMAGED. MUTINY
EFFECT: LAST UPDATE: 0668
NO EFFECTS LISTED

0969 STRDG IN CSTL WATERS: STRANDED OFF BALIKPAPAN 36 HOURS; NO DAMAGE ASCERTAINED;
EFFECT: LAST UPDATE: 0969
NO EFFECTS LISTED

0570 DAMAGE TO MACH: SURVEYOR'S OPINION ENTIRE MACHINERY INSTALLATION SERIOUS CONDITION
EFFECT: LAST UPDATE: 0570
NO EFFCTS LISTED

1070 DAMAGE TO MACH: TURBO-GENERATOR DAMAGED AT SHIPYARD YOKOHAMA DURING DOCK TRIALS
EFFECT: LAST UPDATE: 1070
NO EFFECTS LISTED

0371 STRDG IN CSTL WATERS:	STRANDED OFF CALABRIA 60 HOURS; TOWED GREECE, RUDDER DAMAGED EFFECT: TOWED INTO PORT	LAST UPDATE: 0371
0471 DAMAGE TO MACH:	STBD TURBO-GEN. VERY HEAVILY DAMAGED DUE PRIMING OF BOILERS AND CARRYOVER EFFECT: NO EFFECTS LISTED	LAST UPDATE: 0571
1173 OTHER CASUALTY:	TOWED CURACAO; LUBE PUMP FAILED DAMAGING TURBINE AND GEAR BEARINGS EFFECT: TOWED INTO PORT	LAST UPDATE: 1173
1074 DAMAGE TO MACH:	TOWED NEW YORK; BOTH BOILERS REQUIRE COMPLETE RETUBING DUE LACK OF WATER EFFECT: TOWED INTO PORT	LAST UPDATE: 1074
0276 DAMAGE TO MACH:	DELAYED 11 DAYS PUERTO COTES; BOILER FAN MOTORS GROUNDED AND BURNT OUT EFFECT: REMAINED IN PORT FOR REPAIRS	LAST UPDATE: 0376
1276 STRDG IN CSTL WATERS:	STRANDED SE NANTUCKET IS., LOADED; BROKE UP IN FEW DAYS, TOTAL LOSS EFFECT: LOST 28000 TONS OIL TO ENVIRONMENT; TOTAL LOSS DATA SUPPLIED BY TANKER ADVISORY CENTER, NEW YORK, NY.	LAST UPDATE: 1276

In the ensuing hearing in the U.S. district courts it appeared that the ship had engineroom difficulties and a malfunctioning gyro compass. In court the master was asked why his radio directional signals had shown Nantucket lightship ahead, when it was in actual fact 27 miles astern. Captain Papadopoulos declared he had a month's training in radio equipment and believed the direction finder was functioning properly.

Other examples

The Argo Merchant was in no way an unusual incident. Similar accidents occur with great regularity.
To illustrate this point some recent examples are mentioned below:

July 1976 — The Cyprus tanker Cretan Star, 1955, 18,069 GRT, posted missing at Lloyd's. Her Greek owners reported that navy and air search units found no trace. The vessel was loaded with 28,595 tons of crude oil and sailed from the Persian Gulf for Singapore.

October 1976 The foundering of the East-German tanker Bohlen, 1961, 7644 GRT, off Brittany, causing considerable oil pollution. Only 11 of the 22 crew were rescued.

December 1976 The Panamanean tanker Grand Zenith, 1953, 18,736 GRT, reported overdue. Vessel had 38 crew members on board. Extensive air and sea search found no trace of vessel or survivors.

December 1976 Liberian tanker Sansinena, 1958, 39,672 GRT, ripped in two and partially sunk by explosion in port of Los Angelos. 9 people were killed.

December 1976 Liberian tanker Olympic Games, 1964, 22,380 GRT, ran aground in Delaware River, causing heavy leakage of oil to sea.

January 1977 Liberian tanker Irenes Challenge, 1956, 32,253 GRT, broke in two and sank in the Pacific. Heavy oil leakage to sea and 3 people were killed.

February 1977 Liberian tanker Hawaiian Patriot, 1965, 99,447 GRT, broke in two and sank 300 miles west of Hawaii. One life was lost and 5 million gallons of oil escaped.

March 1977 Panamanian tanker Claude Conway had tank fire/explosion splitting ship in two, in position 15 miles S.E. off Cape Fear. 12 lives were lost, 18 people injured and oil pollution occurred.

Many other examples can be found, but the above mentioned incidents amply illustrate the fact that the Argo Merchant was no isolated incident. Only special external circumstances gave this incident the publicity it received.

9 Sub-standard tankers and the tanker crisis

Occasionally the argument is put forward that the present tanker crisis contributes considerably towards the elimination of the sub-standard tanker problem. It is stated that this contribution is in the form of an increase in the number of tankers scrapped as well as laying up (and eventual scrapping) of older tankers.
On the other hand it may be argued that the present tanker crisis has led certain owners to adopt economic measures of a kind which could result in sub-standard operations.
The question can therefore be raised whether such a contribution exists in actual fact and if if exists, what order of magnitude is involved?
In order to be able to anwer such questions it is first of all necessary to consider the scrap market. Table 30 gives an idea of the number of tankers scrapped during the period 1972–1976 inclusive.

Tankers scrapped

Table 30. No. of tankers scrapped in the various size-groups (1972–1976 incl.).

GRT × 10^3/year	1972	1973	1974	1975	1976
2– 9.9	15	9	13	15	19
10–19.9	75	52	52	124	137
20–29.9	3	2	3	64	85
30+	–	–	–	14	47
total	93	63	68	217	288

Table 30 clearly shows the high number of tankers scrapped in the size-groups of less than 30,000 GRT.

Table 31. No. of tankers scrapped in group as compared with the no. of tankers in group.

GRT × 10^3	no. of vessels scrapped	% of total no. of vessels in group
2– 9.9	19	6%
10–19.9	137	12%
20–29.9	85	22%
30+	47	3%

Table 31 gives an indication for the year 1976 of the number of tankers scrapped in each size-group, relative to the total number of tankers in the world tanker fleet in that particular size-group.
Table 32 shows the considerable proportion of the tankers in the 15–19 and 20–24 year age-groups in relation to the total number of tankers scrapped.

Table 32. No. of tankers scrapped according to age-groups.

year/age (years)	10–14	15–19	20–24	25+
1972	–	35	41	17
1973	–	12	32	19
1974	–	8	42	18
1975	11	75	96	35
1976	36	113	107	32
total	47	243	318	121

Again it would be interesting to examine the number of tankers scrapped in each group relative to the total number of tankers in that group.
Table 33 shows the results of such comparisons.

Table 33. No. of tankers scrapped in group as compared with total no. of tankers in group.

age-group (years)	no. of vessels scrapped in 1976	% of total no. of vessels in group
0– 9	–	–
10–14	36	5.8%
15–19	113	17.5%
20–24	107	35.6%
25+	32	29.0%
total	288	8.3%

Table 34. No. of vessels scrapped, 1976, oil companies v. independents.

GRT $\times 10^3$	oil companies	independents
6–29.9	63	173
30+	27	26
total	90	198

Table 34 gives an idea of the impact of the present tanker crisis on the independent tanker owners.

Table 35. Proportion of tankers scrapped under the 4 identified flags in relation to the total no. of tankers scrapped.

flag	no. of vessels scrapped
Li/Pa	108
Gr/Cy	58
other	122

It can be seen that in 1976 the flags of Liberia, Panama, Greece and Cyprus accounted for 58% of the total number of tankers scrapped in that year.

The information given in Tables 30–35 inclusive, gives the impression that the present tanker crisis affects the previously identified flags, age and size-groups to a greater extent than the other flags and groups. It is, however, more difficult to evaluate how sub-standard operators are affected by the tanker crisis.

Sub-standard operators are possibly in a better competitive position than "standard"-operators through lower capital and operational costs. The lower capital costs are a result of the acquisition of old, second-hand tonnage. The lower operational costs are, for example, the result of lower crew and maintenance costs.

Tables 31, 32 and 33, however, seem to indicate that, in the long term, sub-standard operators are increasingly affected by a slump in the tanker market, as their cost reductions can only be of a short-term nature.

Laid-up tanker tonnage

The following tables give an impression of the number, size, age, flag, ownership etc. of tankers laid up. June 1977, has been selected as being representative for a relatively stable situation, reflecting the present tanker crisis.

Table 36. Laid-up tankers (> 6,000 GRT).

flag	no. of tankers	% of total	% of tanker fleet under flag
No	61	19 %	25.8%
Sw	20	6 %	51.3%
Li	100	31 %	11.3%
Gr	64	20 %	22.8%
Cy	5	1.5%	29.4%
Pa	5	1.5%	3.4%
Br	23	7 %	8 %
other	43	13.4%	2.5%

Table 36 shows that 31% of the total number of tankers laid-up were Liberian vessels.

More detailed investigation, however, indicates that approximately 60% of these Liberian tankers were laid up in the Piraeus district and were owned by Greek interests.

Table 37. Tankers laid-up in size-groups.

GRT $\times 10^3$	no. of vessels in group	% in group	% of world tanker fleet in group
6–10	16	5%	5 %
11–20	83	26%	7 %
21–30	44	14%	11.5%
31–50	51	16%	8 %
51+	127	39%	11.6%

Table 37 illustrates that the effect of the present tanker crisis on smaller tankers is relatively minor as far as lay-up is concerned. Approximately 6% of the total number of tankers in the world tanker fleet in the size-groups of 6–10,000 GRT and 11–20,000 GRT were laid up in June 1977. For tonnage larger than 51,000 GRT this percentage was 11.5%. However, since 55% of the total number of tankers of 30,000 GRT and less are oil company-owned, and only 6% of the total number of tankers laid up belonged to oil companies, it becomes clear that in reality approximately 20% of independently-owned tonnage in the size-groups indicated were laid-up. Greek-owned tonnage took up the greater share.

Table 38. Tankers laid up according to age-groups.

age group	no. of vessels laid up	% in group	% of world tanker fleet in group
0– 5	75	23.3%	7%
6–10	58	18 %	9%
11–15	49	15 %	8%
16–20	79	24.6%	12%
21+	60	18.7%	15%

Table 38 shows the high proportion of older tankers laid up.

Conclusion

In general it can be said that the above-mentioned facts indicate that the present tanker crisis has partially contributed towards eliminating the sub-standard tanker problem. However, taking into account the effect of human operational errors in the accident occurrences, it is certain that the contribution afforded by the present tankers crisis offers no permanent solution. A permanent solution to the problem must be sought elsewhere.

Finally, there is the problem associated with the re-entry into service of laid-up tonnage. Experience gained so far indicates that there have been considerable difficulties in this respect.

Experience to date is generally limited to the larger modern vessels. Yet an increased demand for smaller vessels may occur in the future. As laying up has a deteriorating effect on installation and equipment reliability, the length of time and the methods adopted in laying up these smaller vessels, combined with a low quality of crew, may prove to be a factor in the incidence of accidents with sub-standard vessels.

10 Consequences of the existence of sub-standard tankers

There are several detrimental consequences attached to the existence of sub-standard tankers. This chapter will deal with some of these consequences. The emphasis is on identification rather than quantification. There is so little accurate information available, especially in the field of marine insurance and tanker cost data, that it is extremely difficult to do more than identify these consequences.
It is highly desirable that the relevant bodies and authorities in possession of vital information, should be willing to release such information to reputable organizations interested in these problems. Clearly such co-operation would result in mutual benefit.

The following consequences can be identified:

1. environmental dangers
2. danger of unilateral action
3. effect on marine insurance
4. distortion of competitive positions
5. influence on classification societies
6. increase in international maritime legislation

1 Environmental dangers

Environmental dangers are usually associated with oil pollution and an increased collision risk.
Two well-known examples of oil pollution are of course, the Torrey Canyon and the Argo Merchant. In both cases the major cause of the incident was human operating errors.
As a next step, the extent to which accidental oil pollution contributes to tanker oil pollution as a whole will be examined. Several authorities, such as the U.S. Coast Guard, SCEP/MIT and N.S.A. already studied this problem. Their estimates indicate that approximately 4 million tons of oil find their way into the sea from all sources. With a world oil production of around 2,800 million tons, this amounts to 0.14% of total annual oil production.
A further breakdown reveals that marine operational pollution, such as tank-cleaning at sea, is estimated at 0.9 million tons, i.e. 22% of total marine oil pollution.
Accidental discharges from all sources are estimated to be 0.30 million tons, i.e. less than 7.5% of marine pollution. It can therefore be said that tankers are responsible for approximately 30% of oil pollution in the marine environment, the greater part of which is caused by operational discharges.

Other oil pollution is the result of non-marine operations, such as refineries, industry, motor vehicles, off-shore operations, natural seepage, etc. These figures attempt to put in perspective the oil pollution caused by tanker accidents.

On the other hand, it can be argued that the impact of accidental discharges as a localized environmental hazard, must not be underestimated. The "Torrey Canyon" and "Argo Merchant" are examples.

A United States Coast Guard article called "Tankship accidents and Resulting Oil Outflows" analyses some 450 accidents to tankers of over 3,000 dwt, which resulted in oil outflow, by type of accident and the amount of oil lost. It uses worldwide data on accidents for the years 1969–1973.

The main types of accidents were:

- collision: 28%
- grounding: 27%
- structural failure: 21%

Looking at the type of accident and the amount of oil outflow the results were:

- grounding: 24% of oil outflow
- structural failure: 36% of oil outflow
- collision: 19% of oil outflow

Our estimate of the oil pollution cases for the period 1975–third quarter of 1977 inclusive, is as follows:

type of accident

- grounding: 35%
- incidental: 23% (includes human error, structural failure, etc.)
- collision: 16%
- engineroom fire/explosion: 8%
- cargo tank fire/explosion: 7%
- heavy weather damage: 6%
- contact with jetty: 5%

Flag of polluting vessels

Liberia: 28%
Greece: 18%
Panama: 7%
Other: 47%

Size of polluting vessels

$\leqslant$ 30,000 GRT: 40%
$>$ 30,000 GRT: 60%

The above mentioned information does not give a clear picture concerning the involvement of sub-standard tankers with respect to oil pollution. It should, however, be clear that as far as accidental pollution is concerned, human operating errors play an important role, as indicated by the high contribution of "grounding" and "collision".
Given the size of the Greek tanker fleet, it would seem that its share of total accidental oil pollution is relatively high.

2 Danger of unilateral action

Although oil pollution caused by tanker incidents, is only a small percentage of total marine oil pollution, the incidents which occurred in American waters at the end of 1976, nevertheless provoked a great deal of public anger. This was particularly so in the United States. The incidents resulted in a long series of public hearings, with congressional committees examing all aspects of tanker operations and pollution controls. The adequacy of national and international mechanisms to deal with tanker safety became overnight matters of urgency to the American public.
The result was a host of proposed regulations, such as segregated ballast and, in the case of new tankers, double bottoms. The proposals also included inert gas systems, back up radar systems with collision-avoidance equipment, and improved emergency steering measures. In addition these incidents lent support to powerful interest groups who sought restraints on foreign vessels carrying U.S. oil imports. The incidents therefore not only increased demand for stricter tanker safety controls, but also injected a powerful new element into the campaign for a "U.S. flag oil cargo preference law". Cargo preference could now hide under the cloak of ship safety.

Another consequence of the incidents might be that U.S. unilateralism could undermine IMCO's role as an international rulemaking body. As matters stand, IMCO has agreed, under United States pressure, to hold a special conference on tanker safety at the beginning of 1978 and to bring forward a conference on training and watch keeping, scheduled for the end of 1978 to June 1978. The U.S. proposals, however, are all controversial and it could prove difficult to implement them at an international level.
It is ironical to note that none of the proposals seem to tackle the fundamental cause of the sub-standard tanker problem. Technical requirements alone are not sufficient.
Industry's fears that the position inherent in the IMCO/U.S. situation could lead to politically inspired remedies, seem justified. Nobody in the tanker industry wants another convention as complex as the 1973 Pollution Convention, which is merely a deterrent to ratification.
As stated previously, the fundamental cause of the sub-standard tanker problem is human. In this study sub-standard management and crew have

been identified. It is also estimated that the sub-standard tanker problem concerns at most 15% of the world tanker fleet. This minority can be identified with reasonable certainty and can be approached as such. Again it needs to be emphasized that cause and remedy should be related.

3 Effect on marine insurance

Owing to the lack of available information it was not possible to substantiate the argument put forward in a study, dated September 1976, called: "The Impact of Flags of Convenience", by prof. R. S. Doganis and dr. B. N. Metaxas. Their argument is that flags of convenience have a poor record of partial and total losses.
The higher rate of losses leads to higher marine insurance claims. Underwriters have been unable to make flag of convenience owners pay for their proper share. The competitive nature of the marine insurance market has resulted in a cross subsidiation between shipping sectors as far as premiums are concerned.

A similar argument can be put forward without necessarily stating the generalization that flag of convenience owners are subsidized by owners of other maritime countries. It is probably more accurate to say that "standard" operators, irrespective of flag, subsidize "sub-standard" operators. Given, for instance, the difference between the operational level of the Greek operator-owned tanker fleet and the oil company-owned fleet indicated in Chapter 6, it would be interesting to relate premiums paid and claims settled. However, it was not possible to obtain the necessary information.

4 Distortion of competitive position

Some of the significant features of sub-standard tankers are to be found in their lack of maintenance, second-hand acquisitions, cheap crewing, etc. It seems reasonable to suppose that sub-standard operators, as a by-product of their policy of short-term cost reduction, can distort their competitive position in relation to "standard" operators. That such short-term cost reductions do indeed occur can, perhaps, best be illustrated by quoting from the reports complied by the Dutch Shipping Inspectorate under Regulation 19 of SOLAS 1960, and article 21 of the International Convention of Load lines 1966.
The report concerning a Liberian tanker stated:
"The engineroom was in a neglected condition and no personnel trained to operate the engines and boilers appeared to be on board" (the vessel had Greek owners).
The report concerning a Cypriot tanker stated:
"Radar installation not in working order. Gyro compass and echo-sounder not working".

Radio-installation:

a. main transmitter, reserve transmitter, reserve receiver, automatic keying device, direction finder and portable life-boat radio defective in such a way that they were useless.
b. main receiver and automatic alarm device beyond repair.
c. battery in such a state of neglect that replacement is the only solution.
   - No fire hoses on board
   - Fire line and hydrants unserviceable.
   - All lifeboats and inventory useless.
   - In hull on starboard 16 cracks, on portside 12 cracks.
   - Some 20 others points were mentioned (the vessel has Greek owners).

Many more examples could be quoted, but the above mentioned instances merely serve to illustrate that short-term cost reductions do occur in a manner which is unacceptable.

5 Influence on classification societies

It is again necessary to refer to "The Impact of Flags of Convenience", by prof. R. S. Doganis and dr. N. B. Metaxas. In this study the authors state that the *competitive nature of the classification societies* often leads to a bending of the rules relating to special surveys. The granting of "ex-gratia years" of postponement seems to have become a common occurrence. The authors state that this phenomenon seems to occur more often with large private fleet operators and flag of convenience ships. It therefore appears that the entrepreneurial freedom of some owners has forced *classification societies to lower their standards.*
It is difficult to determine the effects of a lack of adherence to the classification rules on safety. It is, however, a fact that still too often structural failure is a cause of accidents. Such failure is almost exclusively restricted to older tonnage. It is up to classification societies to solve this particular aspect of the sub-standard tanker problem.

6 Increase in international maritime legislation

This argument can perhaps best be illustrated by referring to the spate of tanker accidents which occurred in American waters at the end of 1976. As a result of U.S. pressure, IMCO has agreed to consider a host of proposed regulations, which aim at improving tanker safety. Doubts have already been expressed about the effectiveness of the proposals (see page 54).
Some of the proposals are likely to be adopted at international (i.e. IMCO) level and could possibly be regarded as a surfeit of international legislation since they do not tackle the fundamental cause of the problem.

Furthermore, it could also be said that what is basically a problem intrinsic to the United States should not give rise to legislation at international level. The problem is, however, a major one for the United States since the restricted draught in U.S. ports only allows the import of oil by smaller tankers. Since U.S.-charterers are not selective (enough) in their chartering procedures, a great number of older, smaller tankers call regularly at U.S. ports. As U.S. oil imports soar, it is to be expected that the problem of small old tankers calling at their ports will increase. A simple answer to at least part of the problem would be for U.S.-charterers to take greater care to avoid what could be considered "sub-standard" tankers.

11 Existing organizations and their effects on the sub-standard tanker problem

The Inter-Governmental Maritime Consultative Organization (IMCO)

IMCO is without doubt the most important organization in the field of maritime safety. The influence of this organization has greatly increased over the last 10–15 years and it is the international forum for matters of maritime safety.
The tasks undertaken by IMCO are common knowledge and therefore require no further explanation.
Examples of present IMCO involvement in tasks which have a direct or indirect bearing on the sub-standard tanker problem are the transfer of the Tanker Safety Group casualty data bank to IMCO, the Tanker Safety Conference planned for February 1978 and the conference on Standards of Training and Watchkeeping planned for June 1978.

Despite the many benefits afforded by IMCO conventions, the conventions themselves do suffer from certain limitations, as for example:

1. time difference between adoption, ratification and implementation of a convention
2. control on compliance with the regulations under the various conventions
3. technical nature of the regulations.

The time-lag which is involved in the identification of a particular problem, the drafting of a convention, ratification and entry into force is well known. Such time-lags can give rise to conflicts. Impatience on the part of some nations on account of the lack of much needed action, can lead to unilateral measures. For example, if IMCO were not to agree to the recent American proposals on tanker safety, the United States might well decide to introduce unilateral measures for her ports alone.

The problems associated with the implementation of convention regulations is best illustrated when looking at flags of convenience. In 1970, the Federation of American Controlled Shipping (FACS), for instance, undertook a study of the Liberian maritime programme from the standpoint of safety. It was found that the Liberian laws and regulations, and the conventions it had adopted, were remarkably well advanced. The report stated that the basic flaw which existed was that Liberia had no effective means of ascertaining compliance with its laws, regulations and international conventions. Furthermore, it had no immediate capability to take effective enforcement action.

Almost all IMCO-conventions put the responsibility for compliance with regulations in the hands of the ratifying flag states. It follows therefore that the ratifying flag state should have available an adequate and capable administrative and inspection machinery. It is clear that this is not always the case.
Recently the formation of an international team of safety inspectors drawn from countries with good safety records and experienced administrations, has been suggested. Whether solutions to the sub-standard ship problem of this kind are politically acceptable remains an open question.

Finally there is the fact that most conventions deal with technical solutions. Firstly, there is the problem of uniformity of application. Non-uniformity creates and unfair commercial advantage to the non-conforming party. Secondly, there is the fact that many technical IMCO-requirements have originated from political and emotional reaction to certain events, rather than from a practical analysis of the remedies required to tackle the problem. This problem has been recognized by industry and constitutes one of the reasons for the existence of the OCIMF. This Forum acts as an industry-based counterweight against these political and/or emotional demands.
The need for safety in the tanker industry is universally recognized. The methods by which the required level of safety can be reached are more controversial.
There is a growing awareness that a halt should be called to the unnecessary number of technical requirement, which in actual fact do very little to reduce the problem they were designed to alleviate.

Classification societies

The activities of classification societies can be divided into three areas:

i. classification, i.e. the work carried out on behalf of national authorities.
ii. other services, implying that the technological apparatus which is available is put at the disposal of clients, such as governmental authorities, shipbuilders etc.
iii. research activities.

The quality which is assured by the classification societies is the safety and reliability of technical systems. By ensuring such safety and reliability one can not claim to have assured a safe ship. Important contributions to the overall safety of the ship are also crew, navigational systems, owner's management, etc.
Given the fundamental causes of the existence of sub-standard vessels, it is clear that apart from a small percentage of structural failures, the elimination of the proboem of sub-standard ships does not lie within the scope of classification societies.

Marine insurers

Often hull insurers hide behind the cloak of international competition as an argument that it is not in their scope to contribute towards the elimination of the sub-standard tanker problem. It became clear at the recent IUMI-Conference at Montreux, that this argument is not uniformly accepted by all marine insurers. The chairman of the IUMI's Pollution Risk Committee stated that without insurrance sub-standard tankers would not operate. He continued, however, by saying that there are brokers, for instance, in New York, who specialize in the insurance of older tonnage, especially that of flags of convenience.
Given therefore the international situation in the marine insurance market, as far as competition is concerned, it would seem that little on no co-operation may be expected in this area, which is to be regretted since the means to contribute towards the elimination of the sub-standard tanker problem do in fact exist.

Charterers

The series of tanker incidents which occurred in U.S. waters at the end of 1976 did at least produce one positive result. This result manifested itself in the form of an attempt on the part of the U.S. oil majors to restore confidence.
In the past those few questions asked about owners by U.S. charterers have applied mainly to time-chartered vessels. Following the "Argo Merchant" incident, owner investigation is now more thorough and applies to all forms of charter including single voyages. Since the beginning of 1977 most U.S. oil majors have prepared questionnaires, which delve into past casualty records, crew nationality and competence, survey position, style and past track record of owner/management, etc.
It is to be hoped that such practice will extend to other charterers. Sub-standard tanker operators owe their existence to charterers, without whom they are unable to operate.
Ample means for identifying sub-standard vessels are available to charterers, for example, the computer data bank of Marine Management Systems, Inc., in New York.

National shipping inspectorates

Regulation 19 of chapter I of the International Convention for Safety of Life at Sea, 1960, and article 21 of the International Convention of Load Lines, 1966, provide the national shipping inspectorates of ratifying states with limited power to control with respect to foreign vessels in their national ports.
The limited power to control is in general considered sufficient to ensure

compliance with convention regulations. However, the present conventions fall short where crew-matters are concerned.
Under article 6 and 7 of chapter IV of the 1960 (1974) SOLAS Convention, it is only possible to check the presence of a qualified radio-officer or radio-telephone operator. No control over other certificates and diplomas can be exercised.
Apart from the desirability of having such control power, it is of course, also necessary to reach international agreement on the minimum acceptable level of number and standard of diploma's on board of ships.
It is to be hoped that the IMCO conference scheduled for mid 1978 on "Standards of Training and Watch Keeping", will provide the answer to these problems.

The International Labour Organization (ILO)

The ILO was founded in 1919 and in 1946 became the first specialized agency associated with the United Nations.
One of the recent standard setting maritime activities of the ILO led to the adoption of Convention 147, in October 1976, concerning "minimum standards in merchant ships". The convention will come into force 12 months after the date on which ratification by at least ten members with a total share in world shipping gross tonnage of 25% has been registered (article 6).
Article 2 of the convention describes the tasks to be carried out by the ratifying states.
For those ships registered in its territory each ratifying state undertakes to:

1. have laws or regulations laying down . . . safety standards.
2. exercise effective jurisdiction or control in respect of . . . safety standards.
3. to ensure that seafarers employed are properly qualified or trained for the duties for which they are engaged.

Article 4 of the convention is similar to article 19 of chapter 1 of S.O.L.A.S., 1960 (1974). This article states that each ratifying member who receives a complaint or obtains evidence that a ship calling at its ports, does not conform to the convention standards, may take such measures as necessary to rectify any conditions on board which are clearly hazardous to safety or health.
Although the conventions adopted by the ILO aim in principle at improving social welfare, they also contribute towards eliminating the problem of sub-standard tankers.

The International Federation of Transport Workers (ITF)

The ITF has a membership of 330 trade unions spread over 85 countries. At first glance the ITF seems capable of exercising considerable influence in

shipping matters and to a certain extent this is the case. Its sphere of influence is, however, mainly confined to N.W.-Europe and Australia an it is in these areas that most ITF disputes are found. The Globtik Venus incident is a well-known example. The disputes focus almost exclusively on wage matters and the sub-standard ship problem is only indirectly involved. Consequently, in spite of the fact that considerable publicity is given to ITF disputes and especially to flag of convenience vessels, little or no contribution can be expected from the ITF towards the elimination of the sub-standard vessel problem.

Pilot authorities

Information received shows that the Dutch Pilot Authorities do not consider it part of their duties to report on possible sub-standard vessels to the National Shipping Inspectorate. However, defects which have a direct bearing on pilot-related tasks, such as defective pilot ladders, are reported. This point of view is based on fundamental principles and is also evident in pilot authorities abroad.
It is not the intention of this study to criticize such an approach, but it is noted that in most instances a pilot is the first person to step aboard a vessel calling at his district. As a professional person he will quickly gain an impression of conditions on board and as such can supply valuable information to the national shipping inspectorate.
Perhaps it is possible to reach a consensus of opinion on a different approach at IMPA (International Maritime Pilots' Association) level. This is particularly important as IMPA has consultative status at IMCO and can, therefore, exercise its influence in maritime safety matters.

The International Maritime Industry Forum (IMIF)

The IMIF comprises representatives of independent tanker owners, oil companies, ship builders and banking institutions.
The main reason behind the formation of the IMIF has been the economic consequences of the tanker crisis.
It is clear from this reason and the diversity of interests within the IMIF that the problem of sub-standard tankers does not lie within the scope of the tasks this Forum has set itself.

The Oil Companies International Marine Forum (OCIMF)

The OCIMF was inaugurated in April, 1970, with a view to representing the oil companies in their dealings with governments and other bodies. The OCIMF currently has 45 member companies who between them are responsible for approximately 85% of oil transported by sea. The OCIMF has been granted consultantive status by IMCO.

The objectives and main function of the Forum include:

1. representation of the oil industry at meetings of IMCO and its constituent bodies;
2. representation of the oil industry at other government, intergovernmental or similar organizations.
3. co-operation and liaison with ICS, ITOPF, INTERTANKO, CRISTAL, IPIECA, the E. and P. Forum, national shipowner associations and other bodies, having an interest in maritime pollution and safety.
4. providing advice to members of international bodies on matters relating to national legislation, affecting the oil industry on marine pollution and safety.

Since the OCIMF represents important oil company interests, it is obvious that this Forum can exercise considerable influence in matters concerning sub-standard tankers.
One possible sphere of influence might be to advocate introducing a common chartering policy. This common chartering policy could, for instance, consist of extending the use of questionnaires and delving into the management and accident history of would-be chartered tonnage. Similarly, increased use could be made of the available tanker casualty data banks.
With the help of the above mentioned information it should not be too difficult to identify certain ships as "sub-standard".

The International Chamber of Shipping (ICS)

The ICS was formed in 1921 as the International Shipping Conference, and was reconstituted in 1948 under its present title. Membership of the ICS comprises national shipowners associations who represent almost two-thirds of the world's merchant fleet.
Panama and Cyprus are not amongst those members. The ICS has consultative status by IMCO. The detailed work of the ICS is carried out by standing committees, examples of which are the Marine Committee, Marine Pollution Committee, Marine Law Committee and Tanker Committee.
The Marine Committee participates in all matters under consideration at IMCO regarding marine safety. The Marine Pollution Committee is concerned with all aspects of the protection of the marine environment, dealt with by IMCO. The Tanker Committee considers tanker safety aspects at IMCO level (including chemical and gas carriers). The ICS collaborates closely with the OCIMF on tanker matters and issues a number of joint publications with this Forum.
Given the involvement of the ICS in tanker safety matters, the consultative status granted to it by IMCO and the substantial membership it represents, it is clear that the ICS can exercise considerable influence at IMCO level in matters affecting the existence of sub-standard ships.

The International Association of Independent Tanker Owners (INTERTANKO)

INTERTANKO acts as a forum for the exchange of views between tanker owners and presents the view of tanker owners to the press, the general public and governments. Membership is open to all owners of tankers and combined carriers other than oil companies and governments.

The Association represents approximately 75% of all independently-owned tanker tonnage. It consists of a General Meeting, a Council, an executive Committee, Working Committees and a Secretariat.

INTERTANKO undertakes studies in contemporary subjects and problems affecting its members.

The work carried out on safety and environmental problems, for example, includes efforts to promote the accelerated scrapping of elderly, obsolete tankers. INTERTANKO points out that there is a close relationship between vessels' age and casualty record. It also states that the removal of old, uneconomic and environmentally hazardous tonnage would be an important anti-pollution measure and would improve maritime safety in general. It also draws attention to tankers of 6–29,000 GRT and 15 years and over, though it does not pay attention to ownership.

It would be interesting to compare the contribution of INTERTANKO members towards the total number of tanker accidents, as compared with the accident share of the 25% of independent owners who are not associated. The present report found that a very high percentage of the tankers involved in accidents were independently owned. An attempt has been made to give further indication as to the responsibility for sub-standard tanker operations. However, a general lack of available data has made it difficult to determine ultimate responsibility with any degree of accuracy. It is in this direction that INTERTANKO may be able to further identify ultimate responsibility. Given its substantial membership, it would not appear too difficult to carry out such investigation.

12 Suggestions for improvements

The conclusions reached in this study give an idea of the size of the sub-standard tanker problem, the sections of the tanker fleet in which sub-standard tankers are likely to be found and the fundamental causes of the accidents recorded.
The recommendations are therefore based on these conclusions and include:

1. chartering policies
2. quality of crew and control of safety standards.

Chartering policies

One measure which would lead to an immediate and substantial reduction of the sub-standard tanker problem would be the introduction of a common chartering policy, preferably agreed at OCIMF level. Sub-standard tankers would not exist if charterers made an effort to indentify and subsequently not charter such vessels. It is therefore suggested that, before chartering a vessel, charterers should investigate the vessels' casualty record, crew nationality and competence, survey position, style of management and past record of owner/manager, etc.
Ample means for carrying out such investigations are now available (see page 60).
Special attention should be paid to tankers of less than 30,000 GRT and 15 years and over, owned by small independent owners.

Quality of crew and control of safety standards

This report has identified the need to improve the quality of crew in certain sections of the world tanker fleet. Greater emphasis should be placed on raising human operating standards rather than om improving the present standard of technical safety. In certain maritime countries there is also an urgent need for a capable machinery of administration and inspection to control compliance with convention regulations. It is therefore suggested that the forthcoming IMCO-Conference on Standards of Training and Watchkeeping and any future related conferences should concentrate on the above areas.
The setting up of a separate IMCO Committee, responsible for delegating the necessary administrative and inspection duties in order to control compliance with convention regulations, might be one possible way of overcoming the inadequacy of existing administrative and inspection machineries, especially in flag of convenience countries.

This suggestion goes somewhat further than the recent U.K.-proposal to establish a team of international safety inspectors and allows greater flexibility in the allocation of the above tasks to existing organizations and bodies.

The creation of a neutral IMCO Committee should be seen as a temporary measure and should only remain effective until such time as the maritime countries concerned have an adequate control machinery themselves.

Addendum

A typical example of what happens in the second-hand shipping world in relation to the flags mentioned in this report as prone to sub-standard vessel operations, is provided by an analysis of deep sea employed ship sales by Netherlands Shipowners in 1977. In total 41 deep sea vessels were sold. Their distribution over the various flags and the average vessel age is shown in the following Table.

Table 39. Vessels 3,000 GRT (all types).

		age		
	no. of vessels	min.	max.	average
China	1	15	15	15
Greece	18	13	22	18
Hong Kong	1	20	20	20
Liberia	2	15	17	16
Panama	4	20	24	22.5
Saudi Araiba	1	23	23	23
Singapore	4	19	25	21
Thailand	1	21	21	21
Venezuela	1	17	17	17
Scrap	6	20	32	25
unknown	2	10	24	17
total	41	13	32	20

The flags of Greece, Liberia, Panama and Singapore together accounted for 28 vessels or 80% of the 35 vessels not sold for scrap but for further operations. Greece being again the most dominant in the field.

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