

**ROYAL INSTITUTION OF NAVAL ARCHITECTS  
AUSTRALIAN DIVISION**

**SAFETY OF SMALL COMMERCIAL VESSELS**

**BY**

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## SAFETY OF SMALL COMMERCIAL VESSELS

### INTRODUCTION

Australia has about 15,000 water vessels which are used in commercial activities. The safety of these vessels is of vital interest to the passengers and crew that they carry, as well as to the designers, builders, owners and surveyors who all play a part and therefore bear some responsibility for their safe operation.

In order to assess the benefits and the costs of present safety programs for vessels, and so chart a course for future action, it is necessary to take into account the variety of social, economic, technological and human factors involved.

### BACKGROUND

#### Categorisation of Vessels

Marine vessels include any floating objects that are used to carry persons or things by water. They are generally categorised according to their use into either pleasure (or recreation) craft, commercial (or trading) vessels, or naval vessels. Other vessels such as lighters, barges, and floating platforms are not easily categorised and are referred to as non-navigable vessels in this paper.

Vessels classed as commercial are required to be built and maintained to regulated standards, and in most cases must be manned by a minimum number of qualified and trained crew. Vessels that are surveyed and when cleared to operate, are issued with vessel permits, although some States issue survey certificates instead of permits.

Although the focus of this paper is on commercial vessels, a rational evaluation of their safety needs to look at the indistinct areas that separate commercial from other categories of vessels.

Pleasure craft are not inspected for safety other than at random to check for the carriage of specified equipment. They require a drivers licence to operate at speed. They are potentially less costly to build and to operate, and this financial consideration often outweighs any motivation for an owner of a vessel which "may" be commercial to voluntarily seek classification as a commercial vessel. Hundreds of vessels fall into this category in New South Wales.

Non-navigable vessels may in some circumstances not be covered by any marine safety controls. In Sydney harbour for example, a hopper barge requires a port craft license issued in accordance with regulations made under the Maritime Services Act, 1935. In ports other than Sydney harbour, no such license is issued.

### Profile of Commercial Vessels

There are approximately 15,000 commercial vessels in Australia. About one third of these are in survey in New South Wales. These numbers do not give a good indication of fleet sizes, as they are very sensitive to the minimum size limits determined by different survey authorities.

An analysis of commercial vessels according to size, category of service, and operational area restrictions for New South Wales, based on 1988 statistics is shown in figures 1 and 2.

### Jurisdiction over Vessels

The federal system of government in Australia complicates the legislative controls for vessels in territorial waters by dividing responsibility for their regulation between the Commonwealth and States.

The present arrangement was made in a 1979 settlement which has the effect that all pleasure craft except those proceeding overseas and all trading vessels except those on an international or interstate voyage are controlled and regulated under State legislation.

State laws exempt vessels belonging to any defence force, and special provisions have also been made in regard to off-shore industry vessels which are subject to Commonwealth control even when on intrastate voyages.

State police forces have prime responsibility for the co-ordination of search and rescue unless the resources of the State become overstretched when co-ordination is handed over to the Federal SeaSafety Centre.

Within the category of commercial vessels, uniformity is promoted through the Uniform Shipping Laws (USL) Code which provides for the survey, manning and operation of commercial vessels in Australia.

The provisions of the USL Code do not have the force of law except to the extent that they are adopted in the Commonwealth, State or Territory legislation. When the USL Code was completed in the 1970's the various governments decided that its implementation was required urgently. They decided that each government would apply the requirements in its own jurisdiction as each saw fit. The preferred implementation was one that placed the enabling provisions in an Act, the equipment and manning provisions in regulations, and the technical content in code form where it could most readily be amended and updated.

The diverse manner in which various States and Territories implemented the USL Code in legislative form has limited the potential benefits of a unified approach.

#### Health and Safety laws

The introduction of occupational health and safety laws in Australia has occurred relatively recently. These laws follow the general duties style of legislation which was pioneered in the United Kingdom as a result of the 1972 Robens Committee Report. They may be contrasted in style and philosophical approach

with the specific type of legislation normally found in marine statute.

In New South Wales, the Occupational Health and Safety Act 1983, applies to vessels (although the jurisdiction over vessels not on intrastate voyages is unclear). The Act imposes a general duty of care on employers and employees and is administered by inspectors of the Workcover Authority (formerly the Department of Industrial Relations and Employment).

This general duties style of legislation has yet to make a significant impact on the role of survey authorities in Australia. Potentially, it could replace specific survey requirements, particularly for fishing vessels and low hazard sheltered water non-passenger vessels.

The interface between the traditional role of the ship surveyor and the general health and safety inspector was recently addressed by Dr. J. Cowley in a paper given in London (6). The overlap in responsibilities and roles of the two groups when dealing with ships in United Kingdom ports has been minimised by inter-departmental discussion and agreement between the two groups.

Australia's federal system of government limits Commonwealth involvement in the occupational health and safety matters to Commonwealth employees and a limited number of other groups. The Commonwealth has established a tripartite body, the National Occupation Health and Safety Commission (including Worksafe Australia) to develop, facilitate, and implement a national occupational health and safety strategy. This includes standards development, information dissemination, and the development of common approaches to legislation. This approach has clear parallels with similar Commonwealth-State bodies dealing with sea transport.

An example of the role played by Worksafe Australia is its funding of a 1987 report by Laurie Jeays on the safety of fishermen on trawlers (12). In New South Wales, the Workcover Authority monitors the implementation of international labour convention requirements such as crew accommodation requirements in State legislation.

## GENERAL SAFETY ISSUES

### What is Safety?

Safety is frequently defined as "freedom from hazard". Hammer (1) makes the point that it is not possible to completely eliminate all hazards. Safety is therefore a matter of relative protection from exposure to hazards. Hammer goes on to define a hazard as a condition with the potential of causing injury to people, damage to property, or loss of ability to perform a prescribed function.

The above interpretation of safety includes freedom from injuries to people. Injuries may arise from:-

1. A single traumatic event e.g. falling down stairs, or
2. Repeated or long-term exposure to an agent or event  
e.g. exposure to asbestos leading to mesothelioma

The second of these causes may result in injuries which are occupational diseases. This definition of safety therefore encompasses health issues.

The distinction between the use of the terms "health and safety" and "safety" becomes relevant when discussing concurrent and overlapping requirements under occupational health and safety and marine safety legislation.

### Reasons for Safety Programs

Safety programs are undertaken for one or more of the following reasons:

- |              |   |
|--------------|---|
| 1. MORAL     | Self-preservation, humane considerations, professional code of ethics.  |
| 2. FINANCIAL | Weighing up the costs of the safety program against the cost of injury, downtime, difference in insurance costs, cost of rescues and searches, punitive damages, penalties, loss of trade, cost of emergency back-up. |
| 3. LEGAL     | Society imposed acceptable levels of risk as defined by government (which may also be based on financial and other reasons).  |

In a deregulated environment, the moral and financial considerations are relied upon to achieve the desired safety objective. Unfortunately, the costs of accidents and loss predictions are rarely predictable, and statistical information is not readily available. Particular problems also arise when assessing very small risks of large disasters.

Society often demands government intervention when a person or corporation has the freedom of choice between alternative safety measures if some of those choices expose people or the environment to "unacceptable" levels of hazards. The "paternalistic" response (as some would put it) is to deprive people of choices that they ought not to make.

Robert Smith (1) points out that there is nothing inherently immoral about discussing safety in terms of its costs and benefits. He proposes that society should choose the least costly method for achieving a set safety objective, and that there is no justification for necessarily seeking equal levels of risk in different areas.

Until all safety costs associated with ensuring the safety of commercial vessels are "internalised" in the cost of the vessel and in its operation, it is difficult to get a true picture of the economic alternatives available to decision makers.

Risk analysis approaches that use probabilities to compute economic justifications for accident prevention measures are generally estimated too low, and rarely result in economic justifications for taking preventative measures (H187). Probabilities are useful for comparison of different industries and activities, and for comparing safety levels between different countries within an industry.

Starr (1) differentiates between people accepting a "voluntary" risk, a risk that is freely accepted, and an "involuntary" risk, one that relies on somebody else's judgement. For example, a person using a pleasure boat is accepting responsibility for his own action, whilst a passenger on a ferry accepts risks over which he has no control. Starr found that the public is willing to accept "voluntary" risks roughly 1000 times greater than "involuntary" risks. This view is consistent with the different levels of regulation of recreational versus commercial vessels in Australia.

#### Types of Controls

There are four general types of regulatory approaches available to government(4).

The first is to use general statements of policy to provide guidance for safety programs. These are not capable of detailed enforcement. An example is the Australian Transport Advisory Council (a joint Commonwealth State body) endorsement of the Standards Association standard for pleasure boats as the basic model for the manufacture of small boats in Australia.

The second approach is equipment specific regulation, such as the specification of life-saving equipment and fire appliances. These are useful where leeway for interpretation and flexibility would be counterproductive.

The third approach is to use performance oriented requirements. These leave designers and builders free to find the best way of

complying, but are more difficult and expensive to monitor than specific regulations. Examples are pollution and noise regulations.

The fourth approach is to prepare information and plans for government review and approval. This approach is beneficial when standards are not adequate, as it permits new and better technology to be introduced on a timely basis, and provides flexibility in meeting requirements. A disadvantage is that it adds to design costs and to lead-time particularly when a design would not otherwise be put into plan form.

Paffett, in the May 1989 edition of "The Naval Architect", points out some disadvantages of too much reliance on codes of practice and standards. He asserts that imposed minima often become maxima. The designer is under economic pressure to "design down" to the rules to avoid designing vessels that are larger, heavier, and more costly than ones that just meet the rules.

#### LEGAL RESPONSIBILITY

Every person has a common law duty to exercise due care for the safety of others. This duty is laid on the naval architect, the builder, surveyor, master, crew, survey agencies, and employees. In most cases, government employees are protected from civil action arising out of their work, but not from criminal action.

The designer and builder is not protected from liability for his acts or omissions simply because he followed common practice, or has obtained the approval of a survey authority for his design or work. The following case of *Podmore v Aquatours* which was cited by Ebsworth and Ebsworth in a recent charter boat operators seminar demonstrates this point:

The vessel *John Cadman* was berthing when the master attempted to go astern but could not due to the snapping of the cable connecting the wheelhouse lever to the gears in the engine room. The owner of the ketch with which the *John Cadman* collided succeeded in establishing negligence by the owners of the *John Cadman* on the basis that there should have been a permanent system of communication between the wheelhouse and the engineroom. The vessel had been equipped with dual engine control and it was held to be negligent not to have a system of communication although the MSB did not require it and it was not common practice for such vessels to have such a system.

In New South Wales, statutory requirements lay specific and general duties on various people including but not limited to:-

1. A general duty for employers to ensure the safety at work (which includes commercial vessels) of employees, including the provision of necessary information, instruction, training and supervision;  
(Penalty \$100,000 for a corporation \$10,000 for a person)
2. A general duty for manufacturers (which includes designers)

and suppliers to ensure safety as regards plant for use at work, including steps necessary to make adequate information available in connection with the plant;  
(Penalty \$100,000 for a corporation \$10,000 for a person)

3. A general duty for employees to take care of others and to co-operate with the employer;  
(Penalty \$2,000)
4. Specific duties for the owner of a commercial vessel requiring the vessel to be used in accordance with a vessel permit  
(Penalty \$10,000)
5. Specific duties for the master of a commercial vessel requiring the vessel to be used in accordance with a vessel permit;  
(Penalty \$10,000)

The first three duties arise from the Occupational Health and Safety Act, 1983, the last two from the Commercial Vessels Act, 1979. Under both Acts, where the employer is a corporation, each Director may also be liable.

#### HUMAN ELEMENTS

The disadvantage of trying to regulate safety by enforcement alone is that such an approach ignores the human element. Safety programs that do not place adequate emphasis on attitudinal changes such as when regulating with the idea that "if a law commands, all will obey" and that "inspection will ensure compliance" are not likely to be effective.

Short of prohibition, there are only two aspects of a vessel system that can be influenced and made safer, the technological factors, and the human factors.

The technological elements involve design, engineering, construction and ergonomics. Ideally, these activities may be performed in an error free way and will take into account all foreseeable circumstances. This would require perfect knowledge and skill to achieve, so that the ideal of an "intrinsically safe" vessel is in practice not achievable.

The human factors in a safety system which can be influenced are training, supervision, attitude and behaviour modification, as well as job design and screening to cater for human limitations. These also cannot be made perfect.

Consideration of human behaviour, attitudes and skills are critical to the success of all safety programs.

It is useful to consider the various factors which can influence the safety of commercial vessels, and to analyse them in terms of the mix of technical factors which aim for an "intrinsically safe" vessel, and the human factors, which aim to ensure that all participants "take due care". This is illustrated in figure 4.



### OBSERVATIONS

1. The interface between commercial and non-commercial vessels is not adequately defined within New South Wales. Clear guidelines need to be established and communicated to vessel operators.
2. If the government were to gazette an order classifying vessels such as lighters as commercial vessels, the port craft license system could be eliminated and these craft could be brought under the control of the Uniform Shipping Laws Code which was designed to cater for vessels of this type. Once under the control of the main survey system, appropriate requirements ranging from maintaining the status quo with respect to current practices, to full deregulation of lighters and barges could be considered.
3. There are inconsistencies in safety requirements for vessels having similar uses in different States. These differences should be rationalised.
4. Different survey authorities have adopted the USL Code in different ways and are at various stages of implementation.
5. In New South Wales, major changes to the number of vessels in survey can be made by modifying the lower threshold levels for vessels subject to survey.
6. The large number of small vessels entering survey is conducive to increasing the role of quality control of the manufacturing process rather than to rely on individual survey inspections for each craft.
7. The deregulation of fishing vessels used only in sheltered waters and small non-passenger carrying commercial vessels which are used solely in sheltered could be considered. (The safety of these vessels and crews would then be covered only be the general duties style of health and safety statute.)
8. Survey could be an optional service available to vessels for which survey is not mandatory.
9. In New South Wales, most commercial vessels under 7.5 metres in length are designed by builders.
10. In New South Wales, the design and stability of commercial vessels over 7.5 metres in length are reviewed by a naval architect. Only a minority of these have been designed by naval architects.
11. Commercial vessels are frequently built first and then redesigned to comply with minimum code requirements.
12. The review process for keeping the USL Code current and relevant has slowed perceptibly since the method of amendment through working parties was disbanded. This has been detrimental to the implementation of a uniform standard of design.

13. Designers, builders and operators have a duty to take due care, and should not place total reliance on standards, codes or survey authority approvals.
14. Too little attention is given to the human element of vessel design, construction and operation. Greater emphasis should be given to education so as to increase the knowledge of safety of vessel designers, builders, and operators. This is particularly important for small vessels where the level of knowledge and skill may be minimal.
15. Regulation of safety by enforcement alone is ineffective.

#### CONCLUSIONS

1. The most effective control of vessel safety is achieved by placing control under one authority (which would need to be a federal authority). The Commonwealth could for example set up such an authority and give the States and Territories the option of withdrawing from the survey field if they so desired.
2. Deregulation of controls affecting passenger safety is unlikely to ever take place. But, when the industry itself generates the level of safety demanded by society, then re-regulation to a more effective overall safety system is possible and desirable.
3. To promote industry self-regulation, greater emphasis should be placed on marine legislation which places responsibility for safety on the designer, builder, and operator without being overly prescriptive in nature. The trend should be towards use of the general duties style of legislation within the constraints set by international convention agreements.
4. To promote industry self-regulation, the role of the small ship surveyor should place greater emphasis on the dissemination of information and the provision of advice on matters of safety.

NOTE: The views expressed in this paper are those of the author and not necessarily those of the Maritime Services Board of NSW.

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FIGURE 1

# VESSELS IN NSW SURVEY (1988)

BY CLASS AND LENGTH

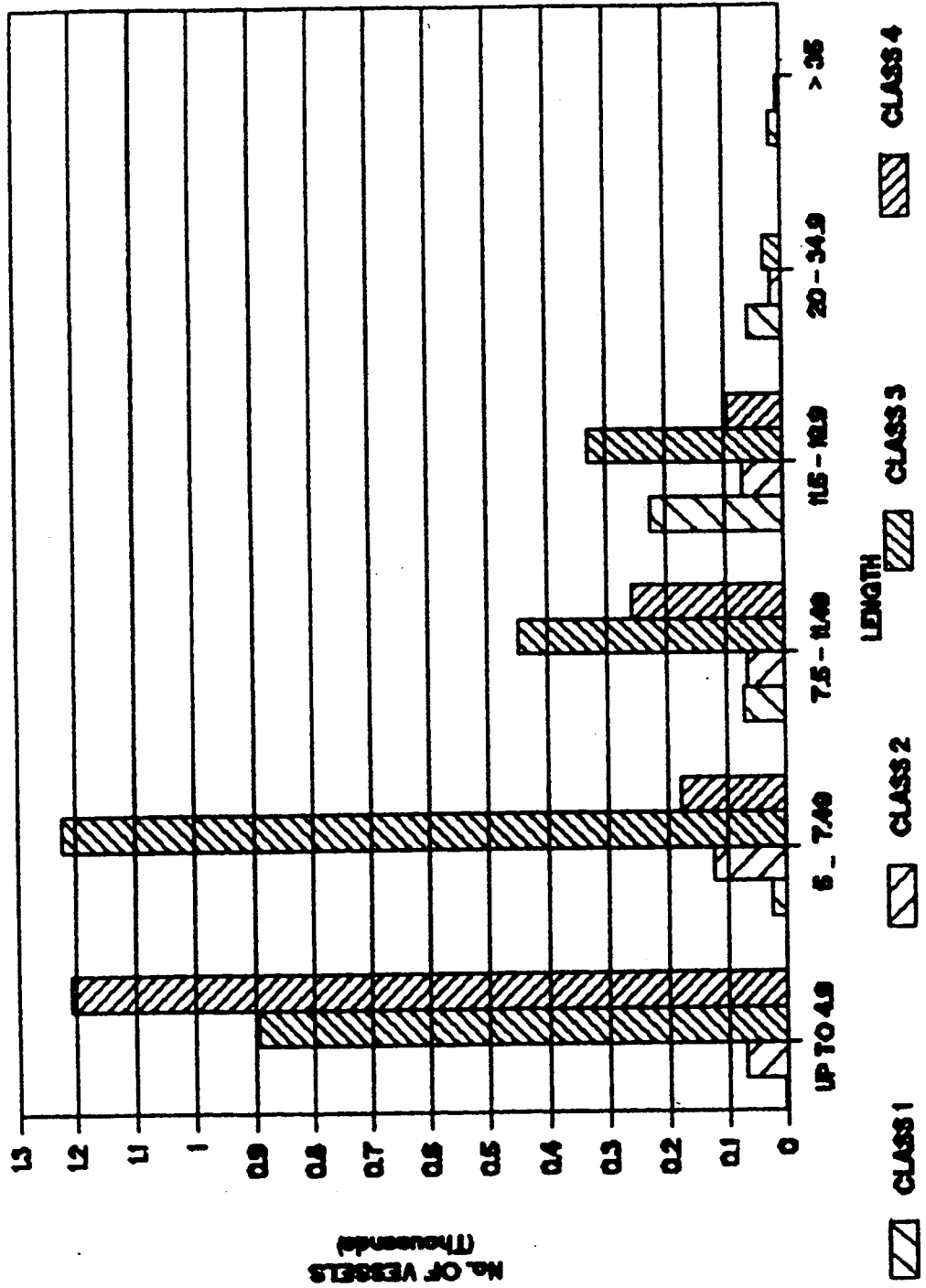


FIGURE 2

# VESSELS IN NSW SURVEY (1988)

BY CLASS AND DESIGNATED AREA

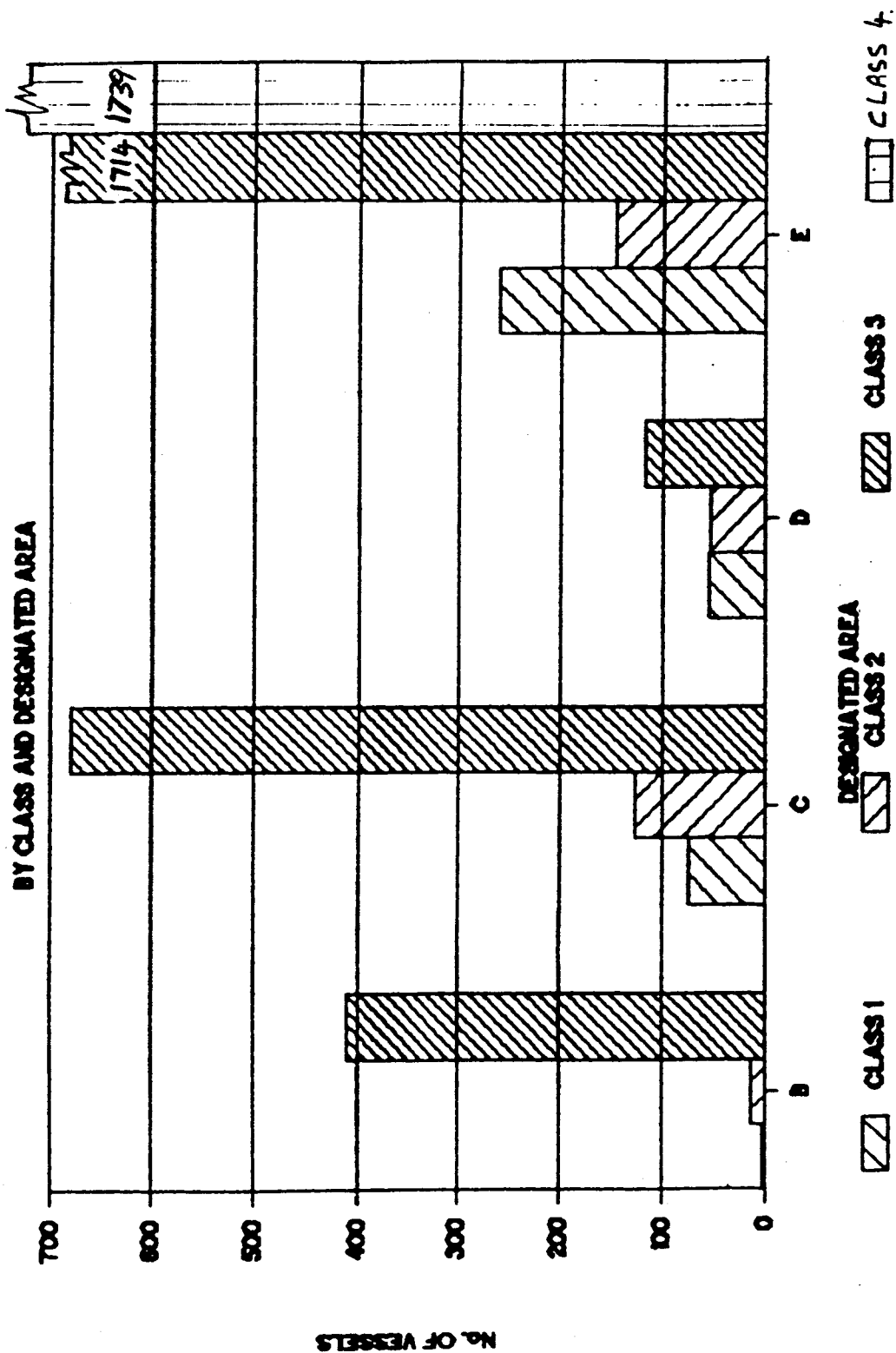


FIGURE 3

## **OVERVIEW OF WATER VESSELS**

### **RECREATIONAL VESSELS**

AUSTRALIA: 400000 (?)  
NSW: 100000

### **COMMERCIAL VESSELS**

AUSTRALIA: 15000  
NSW: 5500

### **NON-NAVIGABLE VESSELS**

Barges, platforms, towed vessels.  
some houseboats, motels, dredgers.

### **NAVAL VESSELS**

*SMALL*

*VESSEL SIZE*

*LARGE*

FIGURE 4

# VESSEL SAFETY

## FEATURES WE CAN INFLUENCE

### TECHNICAL

DESIGN  
ERGONOMICS  
ENGINEERING  
CONSTRUCTION



"INTRINSIC  
SAFETY"

### HUMAN

TRAINING  
KNOWLEDGE  
BEHAVIOUR  
ATTITUDE  
JOB DESIGN  
SCREENING  
SUPERVISION



EXERCISE  
"DUE CARE"

FIGURE 5

# JURISDICTION

