Chapter I. Summary of Findings

Recent estimates are that one-third of all oil pollution of the world's oceans is caused by activities generally characterized as "marine transportation." Tankers understandably are the single largest contributor of such pollution.

The pollution damage threat from any vessel to ocean ecosystems and surrounding environments is serious and substantial. Both short term and long term effects of oil pollution have been assessed, resulting in general agreement that oil spills must be reduced from their present level.

The world tanker fleet has greatly expanded in recent years principally through a major use of supertankers which now number 623 ships totaling 127 million dwt or over one half of the world tanker tonnage. An equivalent number of supertankers are now under construction throughout the world.

The expected introduction of supertankers into U.S. waters exacerbates public concern about pollution of the oceans. Inherent in this concern are questions of the safety of operation of supertankers, the adequacy of their port facilities, the qualifications of the crews that operate them and various operating practices that cause pollution. Further, the large number of smaller tankers operating in U.S. ports, which carry both imported and domestic oil, pose a pollution threat from much the same causes. The overall effect of small tankers in congested ports may be even more extensive than that from supertankers, and the relative damage potential needs clarification.

Oil pollution from tankers originates from two principal sources: (1) tanker accidents, and (2) normal tanker operations, such as tank cleaning, de-ballasting, and other operational reasons for periodically discharging oil overboard. The total of oil spillage into the oceans from tankers of all sizes has been estimated from statistics collected on worldwide operations. Some 1,000,000 tons a year are dumped in standard operations while about 200,000 tons per year of oil is spilled by tanker casualties. In addition, an added 250,000 tons of oil pollution annually is associated with tanker drydocking activities.

There are numerous improvements that could be made to reduce oil pollution from tankers and to increase the safety of their operations. .Some of these improvements have been proposed in the past, some have been adopted in practice by certain segments of the industry,

and some are new proposals by either industry or government. The improvements highlighted in this report relate to those subjects covered by oversight jurisdiction under the Ports and Waterways Safety Act of 1972, which provides the basic U.S. authority for tanker regulations.

Tanker pollution and safety must also be considered in light of the overall need for efficient and effective methods of transportation of petroleum to the United States (imports) and within the United States (domestic). While supertankers appear to offer one of the most efficient and economical means of transporting oil over long distances, these mammoth ships may also present risks to coastal areas and possible adverse impacts which should receive careful consideration.

Pollution and safety issues are often subject to considerable debate regarding accuracy and extent of data, understanding of the effects of pollution, the evaluation of hazards and impacts, the effectiveness of various technical improvements, and the resolution of conflicting expert views on the effectiveness of regulations.

The following principal findings are related to reducing tanker-caused pollution of the oceans and improving the safety of tanker operations:

Pollution Prevention and Safety Data

More, and more accurate, worldwide data are urgently needed on tanker-caused oil spills and accidents in general.

- Additional research is needed on the environmental effects of various levels of oil pollution.

Technical Improvements

- It is necessary to treat the oil pollution problem on a total systems basis in order to make meaningful improvement.
- Fitting double bottoms or double hulls on tankers offer a significant degree of protection from oil pollution in the event of grounding and/or collision accidents.
- Inert gas systems can substantially reduce risks of tank explosions and resulting major casualties.

Improved maintenance, inspection and survey procedures can help alleviate tanker structural failure problems.

. A substantial portion of tanker accidents are caused by human error and improvements in the training and licensing of shipboard personnel are greatly needed.

- Vessel traffic systems and other navigational aids are also in need of continual upgrading and improvement.

Regulations

- The International Pollution Convention of 1973 provides some major improvements in the regulation of tanker-caused pollution worldwide and deserves U.S. efforts to ratify.
- The Ports and Waterways Safety Act of 1972 provides authority to the U.S. Coast Guard for certain regulatory action independent of international treaty, if necessary.
- The National Transportation Safety Board needs to have more autonomous investigative authority than now exists in the case of marine accidents.

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The following discussion expands on the major points highlighted above and presents some of the conflicting views; the subsequent chapters of this report will further develop detailed background information on tankers, the bases for concern on pollution and safety issues, a range of technical approaches for making improvements and the basic international and domestic regulatory authority.

A. Pollution Prevention and Safety

The lack of quantity and accuracy of oil spill data is especially true of oil discharges caused by normal ship operations, for which estimates have been made by extrapolating from that small sample of ships which report their activities. An effort to accurately identify sources, locations and amounts of tanker-caused oil spills would be of significant benefit to all.

Another finding is that more research is needed *on* the environmental effects of various levels of oil pollution. Coupled with an accurate assessment of status and trends of spills, a more complete analysis of the pollution damage to be expected from various spills could also clarify the issue. The long term effects of pollution on the marine environment have been widely debated but with only limited specific investigations as references. Chapter III discusses the issues of pollution and effects in some detail as well as general safety requirements.

B. Technical Improvements

The improvements which could be effected in the tanker transportation system can be categorized in relation to (1) the ship, (2) the crew who operates the ship, (3) the information and control systems, and (4) the environmental influences. These are discussed in detail in Chapter IV. A series of such technical improvements may, in total,

provide the measures needed to significantly reduce tanker-caused oil spills. The following improvements are proposed:

1. Double Bottoms/DOuble Hulls

Many previous investigations have provided a background of varying results regarding the absolute pollution prevention effectiveness of double bottoms or double hulls on tankers. From a technical standpoint, however, it is generally accepted that double bottoms will prevent most oil spillage which results from limited intensity hull ruptures due to grounding, such as those which may occur within harbors or other areas where tankers normally operate at reduced speeds. For double hull tankers, the same may apply for collisions as well as grounding.

This report supports the finding that double bottoms offer a significant degree of protection from oil pollution in the event of a grounding accident.

The added costs and extra safety of tankers fitted with double bottoms are also discussed. It was found from the construction of several new double-bottom oil tankers that the added cost of the double bottom is in the range of 2.54.0 percent-significantly less than previous estimates—and that the presumed associated safety problems either do not exist or can be alleviated with proper design.

This report also recognizes that other locations of segregated ballast tanks, when properly designed to act as defensive spaces, may also offer degrees of protection from oil pollution. In the case of double sides, only collision protection is provided; however, this may be of special value where there is a low grounding potential but a high risk of collision. Double hulls, which incorporate both double bottoms and double sides, offer protection from oil pollution from both grounding and collisions.

2. *Controllability*

Controllability problems associated with tankers (especially supertankers) are discussed in Chapter IV. It is generally accepted that the need for attention to control problems! especially for ship operation in confined waters, rises as the size of ship increases. Stopping and low speed maneuvering of supertankers require both a better understanding of ship control characteristics and better knowledge of local port conditions. It appears that the use of tugboats and auxiliary maneuvering devices could be more carefully designed into all tanker operations. Another finding supported by this report is that additional research into large ship controllability would be most desirable.

3. *Inert Gas systems*

It is generally agreed that the use of inert gas systems to substantially reduce the risk of tank explosions is an extremely beneficial design feature for tankers. Chapter IV discusses the need for and use of these systems. Many tankers are now fitted with these. The finding is supported that inert gas systems are of substantial benefit in large tankers and may be of significant benefit in smaller crude and product tankers as well.

4. *Maintenance*

This study supports the finding that hull structural failures in some tankers-especially those over ten years old and those which may not have been carefully maintained—are the cause of a substantial amount of oil spilled each year. In addition, many of these hull failures result in complete break-up of the ship and the loss of many lives as well as the cargo. It is suggested that special inspection procedures for older tankers may alleviate some of these problems. It is also suggested that converting conventional tankers to segregated ballast tankers with a resulting decrease in cargo capacity may offer several advantages.

5. *Personnel Training* and *Licensing*

There is substantial agreement that human error is a major factor contributing to all tanker accidents (especially grounding and collisions) and that improvements in this area have the potential of providing the most significant benefits. Chapter IV discusses a broad range of possible improvements in the training and licensing of shipboard personnel. Training and licensing practices appear to be more crucial as the size of a tanker increases because of the increased threat of a major accident.

6. *Information and Control Systems*

A broad range of systems to provide better information for the navigation and control of tankers (and other surrounding ships as well) is considered to be a very beneficial safety feature. The systems available and propcsed are clescribed in Chapter IV. It is noted that navigational aids could be improved in many areas, and that vessel traffic systems, collision avoidance systems, improved communications systems and shipboard control itself are all areas in need of continual upgrading and improvement.

c. *Effectiveness of Regulations*

Chapter V discusses the legal and jurisdictional aspects of tanker regulation and control. Both international and national laws apply to the operations of tankers in U.S. waters. Since 94 percent of the imports of oil to the United States is carried by foreign flag tankers, international regulations are of particular interest. It is also noted that the new regulations for tanker design and construction, proposed to be promulgated soon by the U.S. Coast Guard, are substantially the same as international agreements on the subject. However, the United States possesses sufficient legal authority to set more stringent standards.

In addition to steps which may be necessary to implement the improvements outlined above, this report also supports the finding that the International Pollution Convention of 1973 can enable several major improvements in the regulation of tankers toward substantially reducing worldwide oil pollution. There are conflicting views, however, cm the ability of any international agreements with Flag State enforcement (given the nature of flag and ownership of world tanker fleets) to effectively control tanker operations. Given that fact that many other international treaties have taken many years to be ratified, it is felt that this one may also be delayed beyond a reasonable time. It is generally agreed, however, that U.S. efforts to ratify, and to encourage other nations to ratify, the 1973 Pollution Convention will be of benefit to all. A possible exception to this position has been expressed by some environmental groups who claim that an international agreement may not be desirable if it reduces our ability to make improvements unilaterally.

The Ports and Waterways Safety Act of 1972 provides authority to the U.S. Coast Guard to take certain actions independently of international treaty, if necessary, as well as to develop tanker regulations on the basis of the best available pollution control technology for the protection of U.S. waters.

In conjunction with other subjects studied and presented in this report, the area of accident investigation was reviewed and some possible improvements are suggested here. The National Transportation Safety Board investigates major accidents at the request of the U.S. Coast Guard and makes recommendations regarding problem areas. It should be noted that the 1974 amendments to the Federal Railroad Safety Act, addressing the question of NTSB autonomy, required that it no longer be within the Department of Transportation, but rather be an independent agency by April, 1975. This same act, however, did not change the dual relationship in marine accidents of

NTSB and the USCG. Thus, although the NTSB is established as an independent Federal agency to make unbiased investigations of transportation accidents in all fields which are of significant impact or of national interest, it may investigate marine accidents only upon request of the U.S. Coast Guard—and then only after the Coast Guard has completed an initial inquiry.

The Coast Guard has operational responsibility for traffic control systems, licensing of operators or approval of ship safety standards. Therefore, it is sometimes placed in the position of having to expose deficiencies in its own operations while investigating marine accidents. An agency such as NTSB could relieve the Coast Guard of these "self policing" burdens and provide both the Congress and the Executive branch with findings and recommendations outside of Coast Guard jurisdiction.

It is also recognized that more detailed information on major accidents worldwide could provide valuable data for analysis of causes and effects. NTSB or some other appropriate agency could possibly investigate significant accidents throughout the world as well as within U.S. waters with the objective to develop a better understanding of those factors that contribute to such accidents.