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ACTIVITIES RELATING TO TITLE II PORTS AND WATERWAYS SAFETY ACT --ETC(U)
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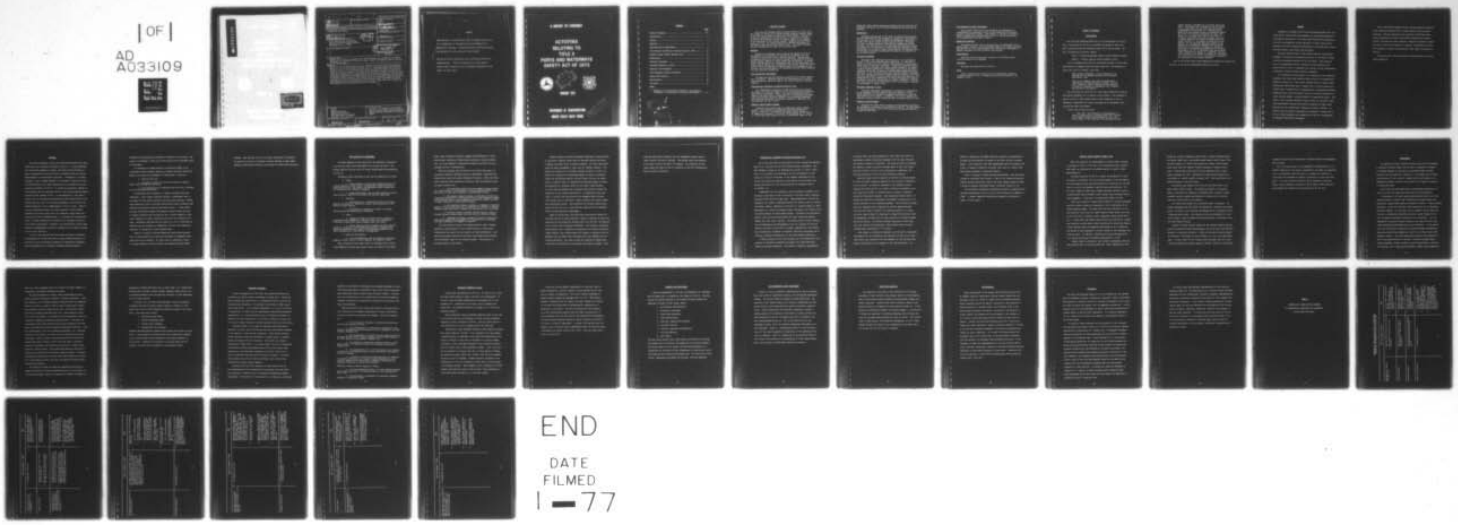

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The Ports and Waterways Safety Act was enacted on 10 July 1972. The purpose of the Act is to promote safety of ports, harbors, waterfront areas and navigable waters of the U. S. The report begins with a general description of the efforts taken by the Coast Guard in 1973. The report discusses specific accomplishments under the following topics: Approachused in meeting the charge of Title II; Data Acquisition Improvement; Internat'l Conference on Marine Pollution, 1973; Domestic Vessel Traffic Systems; Maneuvering; Personnel Standards; Hazardous Chemicals in Bulk; Research and Development; Risk Management System Development; Damage Risk Analysis; and Miscellaneous(describes actions taken under the authority of the Federal Water Pollution Control Act as amended.

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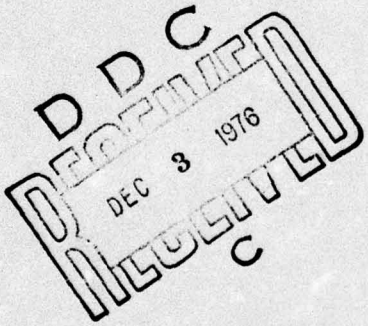
A REPORT TO CONGRESS

ACTIVITIES RELATING TO TITLE II PORTS AND WATERWAYS SAFETY ACT OF 1972



JANUARY 1974

DEPARTMENT OF TRANSPORTATION

UNITED STATES COAST GUARD

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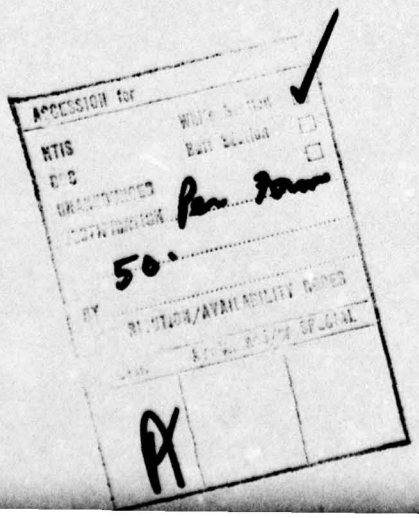

EXECUTIVE SUMMARY

The Ports and Waterways Safety Act was enacted on 10 July 1972. The purpose of the Act is to promote safety of ports, harbors, waterfront areas and navigable waters of the United States. Section 203 of the Act requires that the Secretary, for a period of 10 years following the enactment of Title II, make a report to the Congress at the beginning of each regular session, regarding his activities under the Title. The report begins with a general description of the efforts taken by the Coast Guard in 1973. The report discusses specific accomplishments under the following topics:

Approach

Describes the approach used in meeting the charge of Title II. The emphasis on environmental protection was integrated into the program of vessel safety using a systems approach. Actions taken in response to Title II are closely related to the traditional marine safety program elements of vessel safety and facilitation. In developing a systems approach to minimizing damage to the environment, the Coast Guard is taking into consideration the need for rules, the extent to which rules are expected to improve safety and environmental protection, and the practicability of compliance with the rules, including cost and technical feasibility.

Data Acquisition Improvement

Discusses the need for improving program data for better management information. Describes some of the limitations of the current data base and the efforts to improve the current methods of casualty analysis.

International Conference on Marine Pollution, 1973

The International Conference on Marine Pollution was convened in October 1973 under the auspices of the Inter-governmental Maritime Consultative Organization (IMCO). This part describes the efforts taken by the Coast Guard in preparation for the Conference and summarizes the important features included in the resulting Convention. The Convention represents considerable progress in comparison with international law now in force.

Domestic Vessel Traffic Systems

Summarizes the progress made in establishing vessel traffic systems. This program was established under the authority of Title I of the Act. The objective of vessel traffic systems is to reduce the incidence of collisions and groundings in U.S. waters. It is felt that this program will have a significant impact on the

commercial vessel safety program by reducing risk of collisions and groundings and hence, the oil outflow associated with this type of casualty.

Maneuvering

Discusses the approach to the study of vessel maneuverability and its relationship to the frequency of casualties. The objective of the effort is to develop a method for determining maneuvering criteria for typical ships entering typical harbors. The study will seek to answer questions concerning the maneuvering ability of ships. The results will aid in selecting alternatives to reduce the probability of casualties by either improving maneuvering characteristics, by the use of vessel traffic systems, by improving aids to navigation, by improving personnel training, or by some mix of all of these factors.

Personnel Standards

Historical data indicates that human error is a contributing factor in 85% of the reported marine casualties. At this point, efforts to isolate the root cause of human failures in marine casualties have not been very successful. Trends for increased traffic in all types of hazardous cargo place greater demands on all aspects of cargo transfer operations. These trends pose serious questions regarding the ability of seamen to properly manage required critical functions. Since the human element can never be totally eliminated, this area has been identified as needing greater emphasis. The Coast Guard has undertaken a research effort which has as an objective, the determination of the optimum match of human and mechanical elements necessary to minimize the potential for vessel casualties. This part also lists some of the actions taken in 1973 in an effort to improve the performance of vessel crews.

Hazardous Chemicals in Bulk

Describes regulations promulgated or proposed for construction of and equipment of ships carrying dangerous chemicals in bulk. These regulations are intended to improve containment of cargo and survivability of the vessel. In addition, the list of cargoes considered to present unusual hazards has been increased from 39 to 122.

Research and Development

Describes the Coast Guard's research and development plan which was formulated in response to the charge of Title II. The plan follows the systems approach to the overall pollution problem and comprises 9 major project areas.

Risk Management System Development

This research effort has as its objective the development of a methodology for measuring levels of risk associated with various courses of alternative action. This project is currently in Phase II which is essentially a demonstration effort to test the feasibility of the methodology developed in Phase I.

Damage Risk Analysis

This research effort has as its objective, the measurement of potential human, property, and environmental damage from vessel casualties. This project is in the initial phase which involves the development of general techniques for data collection and analysis.

Miscellaneous

Describes actions taken under authority of the Federal Water Pollution Control Act as amended.

Conclusion

Discusses the implications of Title II.

Annex

Annex I tabulates the results of the International Conference on Marine Pollution, 1973, as compared with the 1954 Convention, as amended in 1962.

REPORT TO CONGRESS

INTRODUCTION

The Ports and Waterways Safety Act of 1972 was enacted on 10 July 1972. The purpose of the Act is to promote the safety of ports, harbors, waterfront areas and navigable waters of the United States. The Act is divided into two parts, namely:

TITLE I - Ports and Waterways Safety and Environmental Quality

TITLE II - Vessels Carrying Certain Cargoes in Bulk

Title II amends Section 4417a of the Revised Statutes (46 USC 391a). This Section is commonly called the Tank Vessel Act. The statement of policy for Title II declares, inter alia,

> "That existing standards...of such vessels must be improved for the adequate protection of the marine environment." and
>
> "That it is necessary that there be established... comprehensive minimum standards of design, construction, alteration, repair, maintenance and operation to prevent or mitigate the hazards of life, property. and the marine environment."

The Tank Vessel Act gave the U.S. Coast Guard authority to develop and enforce standards for the safety of such vessels. The statement of policy in Title II adds another facet to this authority in that it addresses a requirement for vessel standards for the purposes of protecting the marine environment.

Section 203 of the Act states:

> "Sec. 203. The Secretary of the Department in which the Coast Guard is operating shall, for a period of ten years following the enactment of this title, make a report to the Congress at the beginning of each

regular session, regarding his activities under this title. Such report shall include but not be limited to (A) a description of the rules and regulations prescribed by the Secretary (i) to improve vessel maneuvering and stopping ability and otherwise reduce the risks of collisions, groundings and other accidents, (ii) to reduce cargo loss in the event of collision, groundings and other accidents, and (iii) to reduce damage to the marine environment from the normal operation of the vessels to which this title applies, (B) the progress made with respect to the adoption of international standards for the design, construction, alteration, and repair of vessels to which this title applies for protection of the marine environment, and (C) to the extent that the Secretary finds standards with respect to the design, construction, alteration, and repair of vessels for the purpose set forth in (A)(i), (ii) or (iii) above not possible, an explanation of the reasons therefor."

This is the second report being submitted as required by Section 203, Title II, of the Ports and Waterways Safety Act of 1972.

GENERAL

Subsequent to passage of the Ports and Waterways Safety Act, the Coast Guard's efforts have been expanded to include added emphasis on environmental protection. The initial task consisted of developing a plan for the integration of the objectives to reduce vessel source pollution with those traditional objectives of improving marine transportation safety, facilitation and efficiency.

One major objective was to work toward achieving international agreement on the means of preventing pollution of the world's oceans as well as preventing pollution of our own waters. This objective was, to a considerable extent, realized with the acceptance of a major portion of the U.S. proposals for inclusion in the International Conference on Marine Pollution recently completed.

In conjunction with developing a U.S. position on the Conference proposals, the Coast Guard issued an Advance Notice of Proposed Rulemaking in January 1973. This notice proposed that all tankers whose construction would begin after 1 January 1974, or which would be delivered after 1 January 1976, be equipped with a segregated ballasting capability which could be achieved in part by fitting throughout the cargo carrying segment, a double bottom of an appropriate depth. Comments on this proposal provided an input to the U.S. position on the Inter-governmental Maritime Consultative Organization (IMCO) Draft Articles for the International Conference on Marine Pollution. In keeping with the specific requirement of paragraph 7, Section 201 of the Act, these proposals were transmitted to IMCO for consideration as possible international standards.

Work on developing standards using a systems approach continued using currently available data on vessel casualties and polluting incidents. Efforts covered the full spectrum of pollution causal factors beginning with means of preventing discharges by reducing risk of collisions and other accidents, analysis of methods to reduce the loss of cargo in the event of a casualty, and methods to reduce the incidence of vessel source pollution under normal operating conditions.

The report which follows describes the progress made in meeting those objectives.

APPROACH

The report submitted in early 1973 described the method the Coast Guard would use in meeting the charge of Title II. It was recognized that traditional emphasis on safety, facilitation and efficiency of marine transportation alone would not be consistent with the need for added emphasis on environmental protection. Consequently, it became necessary to use a systems approach in an attempt to improve the overall effectiveness of the safety program while at the same time accomplishing the mandate of Title II, to reduce the substantial hazards to life, property and the navigable waters of the United States by vessels carrying certain cargoes in bulk. As was emphasized in last year's report, many of the regulations promulgated under Section 4417a of the revised statutes, prior to the present amendment, can be and are considered responsive to the accomplishment of Title II goals. There is a close relationship between the overall program of vessel safety conducted by the Coast Guard under its commercial vessel safety program and the need for implementation, at a national and international level, of vessel regulations to provide for the adequate protection of the marine environment. Therefore, the actions taken in both these areas are interdependent and must be compatible if the overall program is to be truly effective.

It was to this end that the Coast Guard was heavily involved in the deliberations of IMCO which were directed towards prevention of pollution of the seas through elimination of operational discharges and the minimization of accidental discharges through improved

construction and operational standards for vessels of all nations. The extent of involvement in IMCO by the Coast Guard will be discussed later in this report.

In considering a systems approach to minimizing damage to the environment caused by tanker operations, Congress specified three parameters to be used in the assessment of alternatives. These are:

1. Need for the rules.

2. The extent to which the rules are expected to improve safety and environmental protection.

3. The practicability of compliance with the rules, including cost and technical feasibility.

In developing such an approach, a number of problem areas were identified. Gross casualty analysis revealed a considerable void in the number of tank vessel casualties that were being reported. Further study indicated a need to correlate deficiencies found in existing tank vessels with reported casualties and causal factors. A major effort has been instituted to expand the commercial vessel safety data bank to improve collection and coordination and to insure feedback of relevant information to enable constant monitoring of the inspection program. Information obtained from this effort will aid in selecting the optimum scope and frequency of inspections, and will lead inspection personnel to concentrate on major problem areas.

Based on a review of existing commercial vessel safety program data, it was determined that the scope and depth of management information has to be increased. The Coast Guard is conducting a study of current manpower utilization within the commercial vessel safety

program. This task has as one of its major objectives, the analysis of quantity and quality of program resources required to apply added emphasis needed toward attacking the problems of vessel source pollution.

DATA ACQUISITION IMPROVEMENT

A systems approach to data acquisition and information dissemination has been under active development for the past two years. The systems approach dictates that our concern extend beyond the boundaries of Title II.

Information needs identified to date can be summarized as follows:

1. Vessel:

a. Characteristics of design and construction with particular emphasis on cargo control, seaworthiness, damage resistance, operational control, crew safety, and emergency control factors such as firefighting and lifesaving equipment.

b. Operational history such as owners preventive maintenance program, inspection deficiencies and casualty experience.

2. Personnel:

a. Qualification of, as defined by source of training, physical qualification, examination scores, time qualified for, and service in each capacity.

b. Performance as evidenced in records of casualty investigations and administrative procedures.

3. Cargo:

a. Hazards of products carried in water transport as characterized by flammability, toxicity, reactivity, corrosivity, solubility, normal state versus shipping state, and others.

b. Future impacts on water transport by early identification of new products with widespread distribution potential plus historical experience with cargoes currently being transported and their contribution to the severity of consequences.

4. Operating Environment:

a. Port configurations, aids to navigation, available degree of traffic control, traffic density, and climatic factors.

Most of the data listed above exists in automated files, statistical summaries and hard copy reports, under the control of the Coast

Guard, other government agencies, shippers and manufacturers, trade associations, underwriter classification societies, and port authorities. All have degrees of usefulness dictated by the detail of data, intended end use or accessibility.

While the assembly and utilization of the future data base will continually highlight candidate areas for improvement, experience has already shown areas that require immediate attention. Within the Coast Guard controlled data acquisition activities, some shortcomings receiving major attention are:

1. The automated casualty data file hampers analysis because the level of detail is insufficient to indicate anything beyond a primary cause and some broad categories of contributing factors.

2. The casualty reporting system is structured to serve the traditional determination of fault and has not allowed adequate response to new program areas or revised emphasis and does not capture the level of detail required for system safety analysis.

3. The inspection history of vessels is composed of narrative reports in field office files and is generally not conducive to general analysis except when specific vessels and inspections can be identified.

4. Personnel records, although centrally stored, cannot be accessed except by manual means, and then only for individual seamen.

5. Knowledge of cargoes is generally limited to those presently being shipped and requirements for new products are developed only when a proposal for shipment is received.

The Coast Guard's current risk-analysis project seeks a systems approach to quantification of risk, identification of Coast Guard alternatives and finally the cost benefit of those alternatives. The spill-risk program started with available Coast Guard data and models the identifiable inputs to the casualty process. This project is discussed later in this report.

Casualty analysis utilizing recognized techniques of system safety or statistical analysis cannot await an improved casualty data base. To employ the modern tools of casualty analysis, the Coast Guard presently has under development a logic tree for computer analysis. The system will display all or selected casualty records on a logic tree which will illustrate the interrelationships of nature of accidents, causes and contributing factors, and will permit the user the opportunity to conduct "what if" experiments by adjusting inputs of events and observing the resultant effect on the overall safety program. The tool under development has a potential which goes far beyond the capability of the current casualty file. To demonstrate this capability, a special test data base will be assembled which contains event chains prior to and after a vessel accident, the several causes and contributing factors. This difference in structure between what exists and what can be in a data base will again point out candidate areas for data acquisition improvement.

Based on current data, the Coast Guard completed an analysis of two major sources of vessel pollution, namely an analysis of casualties resulting in oil outflow for calendar years 1971 and 1972, and analysis of oil outflow from intentional discharges. This analysis, conducted along systems lines, included the consideration of various alternative tanker designs, their effectiveness with respect to reducing total oil outflows, and the added costs associated with each compared with oil outflow reductions. The study covered the spectrum of tankers from 21,000 DWT to 75,000 DWT for both product and crude oil trades. This

study was published in February 1973 and complements earlier work on larger tankers (120,000 to 500,000). The earlier study was submitted as an annex to the first report to Congress. The conclusion of this study became the basis for the U.S. position in the 1973 International Marine Pollution Conference.

INTERNATIONAL CONFERENCE ON MARINE POLLUTION, 1973

One of the Coast Guard's major efforts in 1973 included the development of U.S. positions for the 1973 Marine Pollution Conference. The IMCO Assembly's charge to the Conference was in part "...that it shall have as its objective the achievement, by 1975 if possible, but certainly by the end of the decade, of the complete elimination of the willful and intentional pollution of the seas by oil and noxious substances other than oil, and the minimization of accidental spills." (A VII/Res. 237).

Preparations for the conference, which concluded in November 1973, absorbed a great deal of time on the part of the Coast Guard's technical and legal staffs during the past year. These preparations included the completion of a study of segregated ballast for smaller crude oil tankers and product tankers, submission of official U.S. position papers to IMCO, preparation of a draft environmental impact statement, and a study of the cost-effectiveness of double-bottom tankers. Throughout the preparation period, close liaison was maintained with other interested agencies (MARAD, EPA, CEQ, State, and DOD). The working group of these agencies, in its deliberations and development of the U.S. position for the Conference, was aware of the need for uniform, comprehensive, and enforceable international standards to eliminate intentional discharges and to minimize accidental discharges of oil and other harmful substances.

A salient feature of this new convention is the elimination of the practice of introducing seawater for ballast into tanks from which cargo oil has been discharged. This method of operation (segregation

of ballast water into tanks dedicated to that usage) will result in considerably reduced intentional discharges over the long term from new tankers in excess of 70,000 DWT. The practical effect of defining new tankers in terms of specific calendar dates is that even though the date of entry into force of the Convention is indefinite, the clock has started to run on this key construction feature.

Existing tankers will be required to retrofit in varying degrees in order to install equipment required for the practice of retention of oil on board. An important component is the automatic device required for monitoring the oil content of effluent discharges to the sea, which must include a recording device to provide a permanent record for enforcement purposes. This requirement should result in a significant reduction in discharges attributable to human error or to willful disregard of the discharge standards. The Convention provides that this equipment must be approved by national administrations. Since the only other alternative for existing vessels is to retain all cargo slops on board for discharge to reception facilities, there is considerable incentive for the early perfection of these discharge monitoring devices. The primary problems experienced to date have been with accuracy and reliability; these factors should not pose insurmountable technological difficulties.

With regard to accidental discharges, the Convention incorporates requirements for the arrangement and limitation of size of oil cargo tanks which were accepted by the IMCO Assembly in 1971 and which are pending ratification as an amendment to the 1954 Convention. In

addition, subdivision and damage stability criteria are established to increase the survivability of tankers in the event of side or bottom damage. Since statistics show that approximately 80% of accidental pollution is caused by casualties involving total loss of a vessel, this requirement represents a significant advance.

The U.S. proposal on double bottoms was defeated. The Coast Guard intends to reevaluate this concept in light of the Conference decision, seeking through operational controls and other possible means to assure a system of adequate safeguards against accidental release of oil.

This Convention represents considerable progress in comparison with existing international law now in force (1954 Convention as amended in 1962). A tabular comparison showing such progress is contained in Annex I of this report.

DOMESTIC VESSEL TRAFFIC SYSTEMS (VTS)

While the authority for establishment of vessel traffic systems is provided in Title I of the Act, such a program may have a significant impact on alternatives or standards applied to improve vessel maneuverability.

The basic objective of VTS is to reduce the probability of ship collisions or groundings, and the resulting damage to the environment. The Coast Guard has been developing methods for analyzing the need and level of need of such systems in specific ports and waterways. VTS may take a number of forms from a simple regulated navigation area to a sophisticated vessel movement control system using automated surveillance equipment. In any event, the objectives remain the same.

There are a number of vessel traffic systems of varying technology which are either currently in existence or are in preliminary or advanced planning stages. The Coast Guard has been operating a VTS in San Francisco in the form of a Harbor Advisory Radar System since 1970. On 15 March 1973, a voluntary traffic separation system became effective. In May 1973, the traffic system center was relocated to a permanent location on Yerba Buena Island overlooking the entire Bay complex. A much improved radar and communications system is now in operation. The system is being expanded to include coverage of the Sacramento and Stockton areas. In addition, regulations are being developed which will include provisions for mandatory participation in VTS.

Another system in operation, which differs considerably from the San Francisco VTS, is the Puget Sound VTS. Major components of this

system are a Traffic Separation System (TSS), a Vessel Movement Reporting System (VMRS) and a continuously manned Vessel Traffic Center (VTC). The TSS consists of a traffic lane marked by a number of mid-channel buoys which serves to separate vessels navigating in opposite directions. Limited radar surveillance of more congested areas in Puget Sound is planned for 1974. Regulations to require participation were the subject of a public hearing in August 1973. These regulations will become effective in the near future.

The Houston Ship Channel is the site for the Coast Guard's next major vessel traffic system. This system is planned in two phases. Phase I, projected for completion in November 1974, includes a vessel movement reporting system from Galveston to Houston with TV surveillance of critical areas in the Channel.

Two other major systems are in advanced stages of planning. One system encompasses New York Harbor and approaches, including Long Island Sound. The other is for the lower Mississippi River, including both New Orleans and Baton Rouge. Also, plans are now being prepared for a system in Valdez, Alaska including Prince William Sound in association with the Trans-Alaska Pipeline.

Related to vessel traffic systems are the recently imposed requirements for bridge-to-bridge radiotelephone, one of the most cost-effective methods of preventing collisions. Costs are low and are shared equally by the users. This method is now in effect in all U.S. ports and waterways. A recent study of 1827 casualty cases indicates that 22% of the collisions between two moving vessels in meeting, crossing or overtaking

situations could have been prevented if bridge-to-bridge radiotelephone had been used.

One of the major goals of the Department of Transportation is to achieve reductions in the rates of accidents in all modes of transportation. One objective under this goal is to reduce the incidence of collisions and groundings of vessels in selected U.S. ports and waterways. It is felt that this objective can be achieved by improving marine traffic management through the use of vessel traffic services and systems where experience and studies point out the need.

MANEUVERING

As reported last year, limited historical data did not establish a correlation between tanker size and type or frequency of accident. An in-depth analysis of four years of world-wide tanker accident statistics has confirmed this conclusion. The alleged lack of maneuvering ability of very large oil tankers has not been shown to be a significant problem, vis-a-vis the ability of all vessels to maneuver in restricted waters.

While there are many approaches to establishing maneuvering criteria, the two which appear most promising are discussed below.

One approach is to study vessel maneuverability based on the frequency and type of casualty and to determine how vessel design and operational changes might affect the casualty situation. Vessel casualty statistics, as well as individual case histories of vessel casualties, have been studied. At this point, such an approach has not been very fruitful in determining maneuvering criteria, mainly because of the lack of detailed information available on the casualties. One can hypothesize a potential casualty situation and study the effect that varying maneuvering parameters have on the situation. At the present time, the Coast Guard is pursuing this method through a mathematical maneuvering model being prepared as a part of an overall "Spill Risk Analysis" project. The first maneuvering situation being modeled is one of two ships meeting in a fairway. The model includes vessel design parameters (length, breadth, turning characteristic, deceleration ability, etc.), operational parameters (speed, vessel separation,

wind, etc.) and a parameter which will account for human response in recognizing a potentially dangerous situation.

The second approach is to study vessel maneuverability from a normal operations viewpoint as opposed to casualty situations. Using this approach, one can examine specific maneuvers which are presently required of ships in order for them to enter various ports, harbors and unloading terminals throughout the world. The Society of Naval Architects and Marine Engineers Panel H-10, Controllability, which has a Coast Guard member, is presently using this approach to develop a method of determining necessary minimum criteria. The panel has investigated large ships entering several ports throughout the world where the maneuvering situation would be described as difficult. From this investigation, five or six elemental maneuvers, e.g., maneuvers required of all ships in the course of their operations, have been identified. Using a realistic mathematical model for ship motions coupled with input on human factors, the panel hopes to develop a method for determining the maneuvering criteria for a typical ship entering a typical harbor. This generalized approach could then be applied to any specific ship entering a specific harbor. The panel has generally agreed that one cannot talk about maneuvering criteria for a ship unless one also talks about the physical situation where the ship must maneuver.

The results of these two different approaches should help to answer the question of whether maneuvering ability of all ships, or only some ship types, needs to be improved, or whether the answer to

maneuvering accident prevention lies in other areas, e.g., operational controls such as traffic control systems, mandatory speed limits, etc., or improved perception aids and personnel training, or some combination of all of these factors.

In August 1972, the Coast Guard published a notice of proposed rulemaking which would require several classes of vessels of 1,600 gross tons or more to have maneuvering information posted in the pilothouse. This data would include:

1. Speed Versus RPM Tables.
2. Minimum Steerageway Speed.
3. Turning Circle Diagrams.
4. Stopping Time and Distances.

Comments received generally supported the concept with certain reservations. A new proposal was drafted taking into consideration comments on the original draft and was published in the Federal Register on 20 July 1973. Comments were received on the second draft and considered. The final rule is expected to be published shortly.

PERSONNEL STANDARDS

A major consideration of the total risk problem associated with accidental oil spills involves the element of human error. Historical data indicates that human error is a contributing factor in 85% of the reported marine casualties. The question that arises is "What constitutes human error?" Is it outright negligence? Is it lack of training or experience? Do vessel control requirements exceed human performance capabilities? Is a human limited by lack of information necessary to respond in critical situations? At this point, efforts to isolate the root cause of human failures in marine casualties have been inconclusive.

Increased traffic in new types of hazardous cargo and economic pressures to reduce vessel turn-around time have placed greater demands on all aspects of cargo transfer operations. These trends introduce serious questions regarding the adequacy of human ability to properly manage the required critical functions. Most spills are "legally" attributed to "human error." To a great extent, this can be associated with historical design philosophies which do not fully assess human capabilities to perform their designed-in functions as well as the lack of knowledge concerning the root cause of accidents. Since the human element can never be totally eliminated, this area has been identified as needing greater emphasis.

Realizing that the effort dedicated to human factors has not been commensurate with the magnitude of the problem, the Coast Guard has undertaken a research project - Man/Machine Shiphandling System Requirement. The objective of this project is to develop a coordinated

approach to the problem of developing the standards necessary to insure that vessel personnel are qualified in those vital areas of operation which drastically affect vessel safety and public welfare. This project will provide data for the optimum match of human and mechanical elements to minimize the potential for occurrence of collisions, rammings and groundings.

Near-term benefits will accrue from measures, introduced during 1973, directed at the immediate improvement of overall performance for both licensed and unlicensed crew members. Among such measures are:

1. The revision and upgrading of qualifying examinations for deck and engineer officers.

2. The establishment of international standards for navigational watchkeeping (IMCO Resolution No. XVIII) adopted by the IMCO Assembly, November 1973.

3. The establishment of minimum training qualifications for personnel aboard vessels carrying dangerous cargoes (IMCO Resolution No. XIX) adopted by the Assembly, November 1973.

4. The updating of examination material based on a Coast Guard booklet, "Oil Pollution Control for Tankermen" published in February 1973.

5. The implementation of PL 92-339 requiring the licensing of operators on uninspected towing vessels under which 14,000 operators were licensed.

6. A proposal to the Maritime Administration for expansion of available training in the fields of radar interpretation, fire fighting, damage control and pollution abatement using realistic simulator techniques or actual field training.

Additional measures nearing completion include:

1. A revised Tankerman's Manual - contains updated guidance for the safe handling of all dangerous products (for publication in early 1974).

2. The development of standards for qualifying tankermen handling all dangerous cargoes.

HAZARDOUS CHEMICALS IN BULK

Acting under the authority of 46 U.S.C. 170 and 46 U.S.C. 391a, the Coast Guard expects to issue a new Part 153 of Subchapter O of Title 46, Code of Federal Regulations as a proposed rule in late December 1973. Publication of the final rule is scheduled for March 1974. The proposed regulation will apply to U.S. flag self-propelled vessels.

These regulations contain standards adopted by IMCO in the Code for the Construction of and Equipment of Ships Carrying Dangerous Chemicals in Bulk, Resolution A.212(VII), and will insure that U.S. flag vessels will be in full compliance with the IMCO Code.

Specifically, those standards relating to hull types and containment system types are included. To be assigned a hull type number, calculations must be submitted to the Coast Guard demonstrating the vessel's stability in the event of grounding or collision damage. In addition, cargo containment systems for more hazardous products must be located clear of the hypothetical damage. Thus, the intent of the proposal is to insure that, for a certain amount of damage, the vessel will remain afloat and, further, that the more hazardous cargoes will not be released. Another provision contained in the proposed Part 153 is the limitation on tank sizes in certain types of containment systems. This standard is also contained in the IMCO Chemical Ship Code and limits a tank of Type I (most hazardous) to 1,250 cubic meters and Type II to 3,000 cubic meters.

A new Part 154 was added to Subchapter O of Title 46, Code of Federal Regulations, entitled "Special Interim Regulations for Issuance of Letters of Compliance." The list of cargoes considered to present unusual hazards was expanded from 39 to 122. Additionally, Letters of Compliance are now issued to foreign vessels for a period of two years and vessels must be satisfactorily reexamined for a reissuance of the Letter. Part 154 also allows for the acceptance of an IMCO certificate attesting that the vessel has been built in full accordance with the IMCO Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, Resolution A.212(VII), in lieu of a Letter of Compliance. In effect, this new part gave the weight of law to existing policy implemented nearly ten years ago under a Navigation and Vessel Circular (NVC 13-65). Part 154 became effective on 15 June 1973.

RESEARCH AND DEVELOPMENT

A major accomplishment in 1973 was the formulation of a Research and Development plan in response to the charge of Title II. The plan follows the systems approach to the overall pollution problem and comprises nine major project areas, namely:

1. Risk Analysis and Definition.
2. Intentional Discharges.
3. Load/Unload Operations.
4. Cargo System Safety.
5. Collision, Ramming and Grounding.
6. Structural Failure.
7. Flooding, Capsizing and Foundering.
8. Fire and Explosion.
9. Crew Safety.

The first major project area, Risk Analysis and Definition, provides the primary tool of direction and integration for the whole program. The initial effort in this project involves the development of a methodology for searching out the consequences of alternative actions and selecting those options which appear best. The first part of this effort, methodology development and planning, has been completed.

RISK MANAGEMENT SYSTEM DEVELOPMENT

Analysis of risk is presently conducted with the aid of casualty data, the review of investigation reports, and specialized engineering studies. The current method of analysis has some limitations. The objective of our research effort is to develop a methodology for measuring levels of risk associated with various alternative courses of action. Formal quantitative risk analysis, designed to provide a common yardstick for assessing a wide variety of safety actions, has been desirable but was not a necessary goal prior to passage of the Ports and Waterways Safety Act. The initial effort of the risk management concept, spill risk analysis methodology development, has been completed. Phase II, a demonstration effort to test the feasibility of the general approach by application to one operating situation, is underway. Phase III, predicated on the success of Phase II, will involve the extention of the methodology to cover damage assessment, cost analysis, and additional operating situations.

DAMAGE RISK ANALYSIS

The objective of this part of the risk factor is to develop techniques of data collection and analysis which will allow measurement of the potential human, property and environmental damage from vessel casualties. Statistics may tend to produce a state of complacency because the frequency of major spills has been low. In the absence of quantitative measures of potential damage, it is difficult to assess the importance of preventive measures and to balance the costs of increased safety against the costs of a spill. The significance of these spills, like floods and earthquakes, is not in their average effects but rather in the consequences of any major event. The initial part of this effort is underway.

MISCELLANEOUS

Under the authority of the Federal Water Pollution Control Act, as amended, pollution regulations covering transfer operations were published in Part II, Volume 37, Number 246 of the Federal Register. These regulations govern the design, construction, and operation of vessels operating in navigable waters and contiguous zones of the United States and govern the design, construction, and operation of certain onshore and offshore facilities engaged in the transfer of oil in bulk to and from vessels having a capacity of more than 250 barrels. Vessels and facilities affected have until 1 July 1974 to comply with these regulations; however, the marine industry is already in the process of modifying equipment, facilities and operating procedures to insure compliance. As a result of flooding during 1973 throughout much of the central part of the nation which interfered with the operation of drydocking and gas-freeing facilities, it was necessary to delay full implementation of one part of these regulations, that part concerning a reduction in the period between required drydocking of tank barges operating in fresh water. Compliance will still be required by 1 July 1974 for barges which have not been drydocked since 1 July 1970.

CONCLUSION

The Ports and Waterways Safety Act of 1972 provides for the development of standards of design, construction, alteration, repair, maintenance and operation of vessels to prevent or mitigate the hazards to life, property and the marine environment, with the emphasis on prevention. The Act requires that there be improvement in vessel construction standards and a greater degree of marine traffic management. It is equally applicable to U.S. vessels and to foreign flag vessels in the navigable waters of the United States.

To provide a timely response for the protection of life, property and the marine environment, Section 7(c) of Title II of the Act requires promulgation of regulations by 1 January 1976. A subsequent amendment requires promulgation of these regulations by 30 June 1974 for vessels engaged in the coastwise trade, a trade limited to U.S. flag vessels. In developing regulations, the model will be the uniform standards for marine pollution protection contained in the recently concluded International Convention for the Prevention of Pollution from Ships, 1973. Applying these standards and necessary operational constraints to vessels engaged in the coastwise trade should provide early satisfaction of the intent of the Ports and Waterways Safety Act and should avoid conflict with the international standards when the International Convention is later ratified. To exceed the conference standards in respect to U.S. vessels is hardly justified when considering their small percentage of the world fleet and could impair the competitive standing of the U.S. vessels as well.

To obtain timely and equitable implementation of the Ports and Waterways Safety Act, the regulations will be directed toward achieving compliance with the international convention standards, supplemented by operational constraints necessary for protection of life, property and the marine environment. In the interim, between promulgation of regulations under the Ports and Waterways Act and adoption of the international convention, additional operational controls can be imposed to meet the above objective. In conjunction with this course of action, we will be evaluating on a continuing basis the effectiveness of the 1973 International Convention, retaining under study the need for further requirements as to the design, construction, maneuvering and operation of ships.

ANNEX I

COMPARISON OF CERTAIN MAJOR FEATURES OF INTERNATIONAL CONVENTIONS FOR PREVENTION OF POLLUTION FROM SHIPS

COMPARISON OF CERTAIN MAJOR FEATURES OF INTERNATIONAL CONVENTIONS FOR PREVENTION OF POLLUTION FROM SHIPS

	1954 (as amended in 1962)	1973
Applicability as regards carriage of oil	1. Seagoing tankers 150 gross tons and over 2. Other seagoing ships 500 gross tons and over.	1. All oil tankers 150 gross tons and over. 2. All other ships 400 gross tons and over including novel craft and fixed and floating platforms.
Dispute settlement	1. Referred to International Court of Justice unless all parties agree to arbitration.	1. Compulsory arbitration by specially formed tribunals upon application of any party to dispute.
Amendment procedure	1. Effective only upon specific acceptance via IMCO Assembly and Contracting States.	1. Speedier method for Annexes and appendices via IMCO Committee and tacit acceptance procedures.
Survey & Certification	1. No comparable provision.	1. Survey at 5 year intervals and at intermediate (mid period) intervals. 2. Equipment must be approved by Administration (monitors, filters, separators, interface detectors). 3. Administration issues Certificate attesting to compliance by its ships, which certificate shall be accepted except when there are clear grounds to believe the ship is not in compliance.

	1954 (as amended in 1962)	1973
Application to ships of non-parties to the Convention	1. No comparable provision.	1. Convention requirements shall be applied as necessary to insure no more favorable treatment is given to such ships.
Definition of Oil	1. Limited to crude, fuel, heavy diesel and lubricating oils. 2. Does not include bilge slops and fuel and lube oil purification residues.	1. Includes all petroleum oils except petrochemicals (which are regulated by Annex II).
Discharge criteria in Prohibited Zones (this term does not appear in the 1973 Convention which uses a distance from land criterion)	1. Prohibits discharges by all ships in concentrations in excess of 100 parts per million within the prohibited zones. 2. Prohibited zone generally 50 miles or greater from nearest land for tankers. Prohibited zone applies to other ships unless proceeding to a port not provided with adequate reception facilities.	1. Prohibits discharges which leave visible traces unless it can be established by installed instruments that the concentration discharged was less than 15 parts per million. 2. For tanker cargo slops, discharge is prohibited within 50 miles from nearest land. For other ships slops, and other tanker slops, discharge is prohibited within 12 miles from the nearest land.

	1954 (as amended in 1962)	1973
Discharge criteria outside of the Prohibited Zones	1. No restriction on discharges from a ship less than 20,000 gross tons. Vessels over 20,000 gross tons are limited to discharges whose concentrations are 100 parts per million or less, unless when in the opinion of the Master, circumstances make it unreasonable and impractical to retain the higher concentrated slops on board.	1. Tankers must meet all the following conditions: a. ship is proceeding enroute. b. discharge is limited to 60 liters per mile instantaneous rate. c. total quantity discharged is limited to 1/15,000 of cargo last carried for existing tankers and 1/30,000 of cargo last carried for new tankers. d. tanker bilges, except pump rooms, shall be treated same as other ships. 2. Other ships must meet all of the following conditions: a. ship is proceeding enroute.. b. oil content of the effluent must not exceed 100 parts per million.
Enforcement mechanism	1. No comparable provision.	1. Requires that the monitoring and control system be in operation and a permanent record made anytime oily effluent is being discharged, except for clean or segregated ballast.

	1954 (as amended in 1962)	1973
Construction and Equipment Requirements to control operational discharges of oily mixtures.	1. No comparable provision.	1. Segregated ballast is mandatory for new tankers of 70,000 deadweight tons and greater, and is optional for tankers of less than 70,000 deadweight tons. Note that "new" tankers are defined by calender dates and are therefore not dependent upon entry into force of this Convention. 2. Retention of Oil on Board (LOT) is mandatory for all tankers. 3. Mandatory installation of effluent monitor and control system, provision of slop tanks, and provision of oil/water interface detectors. Effluent must comply with discharge criteria or be transferred to reception facility. 4. Other ships require sludge tank installations, oil water separators and/or filters dependent upon ship size.
Reception facilities	1. Provision to promote according to need of ships using ports.	1. Expanded provision to undertake to insure availability and adequacy at oil loading ports, repair ports, and at other ports according to the needs of ships.

	1954 (as amended in 1962)	1973
Oil Record Book	1. Establishes basic requirement to provide oil record book and requires entries for specific operations.	1. Expands requirements to provide entries for more specific operations and in greater detail to aid in enforcement.
Construction Requirements to limit the amount of oil discharge in case of accidents.	1. No comparable provision.	1. Establishes damage assumptions and methods of calculation of the amount of hypothetical oil outflow for tankers. 2. Establishes tank arrangement and size limitations for the cargo tanks of tankers. 3. Establishes subdivision and damage stability criteria to be applied to tankers to increase survivability in the event of accident.

	1954 (as amended in 1962)	1973
Additional annexes for substances other than oil. Annex II is mandatory and Annexes III, IV and V may be adopted at the option of Contracting States.	1. No comparable provision.	1. Annex II details mandatory requirements for construction of chemical tankers and discharge criteria for liquid noxious substances in bulk. 2. Annex III contains regulations for the prevention of pollution by harmful substances carried at sea in packaged form, or in freight containers, portable tanks or road and rail tank cars. 3. Annex IV contains regulations for the prevention of pollution by sewage from ships. 4. Annex V contains regulations for the prevention of pollution by garbage from ships.