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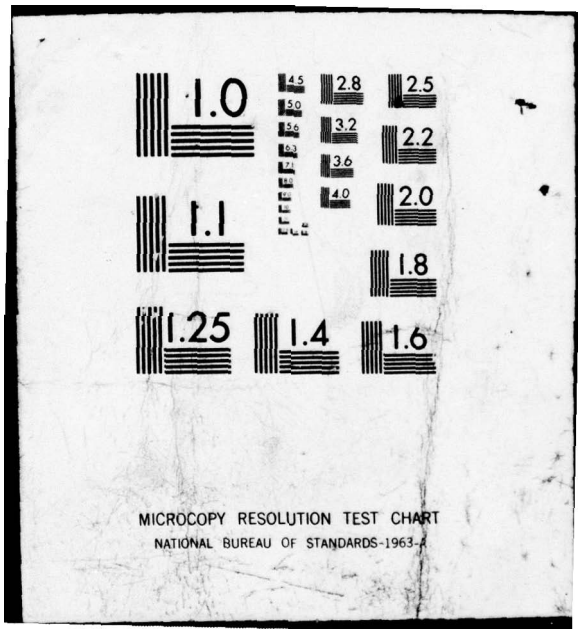
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A REPORT TO CONGRESS

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

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DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

PORTS AND WATERWAYS SAFETY ACT OF 1972 / TITLE II REPORT JAN 1977

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16. Abstract
A report to Congress submitted by the Secretary of the Department of Transportation, prepared by the Coast Guard, as required by Title II of the Port and Waterways Safety Act of 1972. ~~The report~~ covers the Activities of the Secretary ~~regarding Title II~~ for the calender year 1976.

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INTRODUCTION

Title II of the Ports and Waterways Safety Act of 1972, which amended the Tank Vessel Act (46 U.S.C. 391a), states in Section 201(7)(A):

> "The Secretary shall begin publication as soon as practicable of proposed rules and regulations setting forth minimum standards of design, construction, alteration, and repair of the vessels to which this section applies for the purpose of protecting the marine environment. Such rules and regulations shall, to the extent possible, include but not be limited to standards to improve vessel maneuvering and stopping ability and otherwise reduce the possibility of collision, grounding, or other accident, to reduce cargo loss following collision, grounding, or other accident, and to reduce damage to the marine environment by normal vessel operations such as ballasting and deballasting, cargo handling, and other activities."

Section 203 of the Act requires an annual report to Congress. Section 203 states:

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"Section 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 therefore."

This is the fifth report being submitted pursuant to Section 203 of the Act.

EXECUTIVE SUMMARY

Congress, by means of Title II of the Ports and Waterways Safety Act of 1972, directed that rules and regulations to protect the Marine Environment be adopted as soon as practicable. These rules and regulations shall to the extent possible, include but not be limited to:

1. Standards to improve vessel maneuvering and stopping ability and otherwise reduce the possibility of collision, grounding and other accidents.

2. Standards to reduce cargo loss following collision, grounding or other accident.

3. Standards to reduce damage to the marine environment by normal vessel operations such as ballasting and deballasting, cargo handling and other activities.

Estimates of worldwide annual oil inputs to the oceans from tankers show that 85% of this input is due to intentional discharge from tanker operations (routine tank cleaning and ballasting) and the other 15% is due to tanker accidents. 1/ The portion

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1/ Final Environmental Impact Statement; Regulations for Tank Vessels Engaged in the Carriage of Oil in Domestic Trade, 15 August 1975.

attributable to tanker accidents includes 4% due to groundings, 3% due to collisions and rammings, and 8% due to breakdowns, explosions, fires, structural failures and other involvements. These statistics show that the highest initial payoff in the reduction of oil outflows from tankers lies in the reduction and control of operational pollution. For this reason, the Coast Guard has emphasized the promulgation of regulations that concentrate in that area. The Coast Guard has proposed operational and design standards for self-propelled vessels carrying bulk liquefied gases in the Federal Register of 4 October 1976 (41 FR 43822) and carriage of bulk dangerous or extremely flammable liquid cargoes in the Federal Register of 24 June 1976 (41 FR 26126). In addition, regulations and the accompanying environmental impact statement for U.S. tank vessels carrying oil in foreign trade and foreign tank vessels that enter the navigable waters of the United States have been published; the final regulations publication is in process at the time of this report's preparation.

Despite the emphasis on area 3, areas 1 and 2 have not been neglected. With respect to the reduction of the possibility of collisions, groundings, or other accidents the Coast Guard is continuing to collect the necessary knowledge and data to facilitate a systems approach to this problem. Efforts in this area have been concentrated in the human factors aspect and formulation of mathematical models and methodologies required for

analysis. The Coast Guard has, in addition, continued to be active in the Marine Environmental Protection Committee of IMCO.

A. Description of the rules and regulations prescribed by the Secretary.

i. Rules to improve vessel maneuvering and stopping ability and otherwise reduce the possibility of collisions, groundings, and other accidents.

Final regulations requiring the posting in the pilothouse of the individual maneuvering and stopping characteristics of ships for 1,600 gross tons and over were published in the Federal Register on 15 January 1975 (40 FR 2689) and was reported in the fourth Title II Report to the Congress, dated January 1976. Since that time, the Coast Guard has been exploring additional related methods of reducing risk.

A notice of proposed rulemaking entitled "Navigation Safety" was published in the Federal Register on 6 May 1976 (41 FR 18766) which prescribed navigation practices as well as equipment and testing requirements for all vessels of 1,600 gross tons and over when operating on the navigable waters of the United States, except the Panama Canal and St. Lawrence Seaway. The purposes of these rules are to prevent vessel collisions and groundings

and protect the navigable waters from environmental harm resulting from vessel collisions and groundings. These rules are contained in Appendix I of this report. We anticipate publishing these regulations in final form during the first quarter of calendar 1977.

A system analysis approach to the reduction of the possibility of collisions, groundings, and other accidents and to the improvement of maneuvering capability has been initiated. The effort is progressing along three avenues of endeavor:

1. Human performance analysis in the marine domain.

2. Vessel system performance analysis in the marine domain.

3. Analysis methodology development.

Progress and results, to date, in each of the above areas are as follows:

a. Human Performance

An analysis of marine accidents by the Coast Guard, as well as other agencies [1/], has shown that human error plays a

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1/ National Academy of Science, "Human Error in Merchant Marine Safety," Washington, D.C., June 1976

dominant role in the chain of events leading to a marine accident. For this reason the Coast Guard is attempting to gain more precise knowledge about the interactions between the human "controller" and the vessel system in the marine domain. Two studies were completed in this area. The first concerned an investigation of piloting practices on board U.S. vessels entering ports in this country. This investigation was to assess the feasibility of identifying and obtaining data useful in the identification of sources of information or cues used by pilots in navigating a vessel. The next step was to study the manner in which this information is processed and then presented to determine precisely how the processing and presentation relates to the pilots' ability (or inability) to safely navigate a vessel. The second study concerned functional job analysis of all merchant vessel control tasks to identify the human factor aspects of tanker/freighter and towboat control functions.

The results of these studies have not been completely evaluated, but they do represent a first step in the development of the body of knowledge required for the analysis and determination of the cause of collision, ramming and grounding accidents.

b. Vessel System Performance

Not all marine accidents are due to human error. A mismatch or failure in the other subsystems (cargo, pathway,

propulsion, steering, etc.,) can also cause accidents that damage the environment. In general, it is possible to state that both the human controller and the other system elements must perform within a specified level in order that the probability of a collision, ramming or grounding accident remains within an acceptable range. The performance boundaries for either the human or the other system elements that provide an acceptable probability or risk level are not known. The Coast Guard is attempting to acquire the basic information needed to establish appropriate performance boundaries. Examples of the research bearing on this part of the problem are briefly described below.

The first effort concerns an analysis of collisions with bridge structures. The purpose of this study is to investigate bridge accidents by examining accident reports, waterway characteristics, bridge configurations, environmental conditions, and any other information which might be helpful, in the attempt to determine the causes of collisions with bridge structures.

Another research project concerns the investigation of maneuvering characteristics and stopping performance of tank vessels. This investigation included:

1. The development of a mathematical model to represent vessel maneuvering motion.

2. The collection of vessel hydrodynamic data and vessel parameters.

3. Vessel motion prediction through simulation by means of the mathematical model.

The equations of motion and hydrodynamic coefficients were developed for a typical medium-size tanker. Maneuvering simulation experiments have provided data which show good correlation between maneuvering motion predictions and full-scale trial results.

Another project related to vessel system performance is one that involves the analysis of the reliability and maintainability of the critical vessel subsystems. Present efforts underway involve analyses of steering subsystems. In essence, the objective of this effort is to determine the requirements for assurance of acceptable reliability and availability levels for vessel steering systems.

c. Analysis Methodology Development

Once the knowledge and data developed in a. and b. above are available, we will be able to explore scenarios to determine

alternatives to reduce the probability of collisions, rammings, and groundings. A mathematical model is being developed combining all the above inputs for analysis.

ii. To reduce cargo loss in the event of collision, grounding, and other accidents.

In the 1976 Title II Report to Congress, the Coast Guard reported that a Notice of Proposed Rulemaking had been published proposing strategic location of segregated ballast areas in certain tank vessels to minimize the outflow of cargo in case of a collision or grounding. The Coast Guard published final rules in the Federal Register of 8 January 1976 (41 FR 1479), which are contained in Appendix II of this report. These rules outline design configurations that have been found to be superior to other configurations in mitigating cargo outflow.

Five research projects are in progress in the area of Structural Failure Prevention. The first project concerns collision damage resistance. The intent of this investigation is the evaluation of phenomena that contribute to the ability of a longitudinally framed ship, such as a tanker, to withstand a minor collision.

The second project concerns the evaluation of interim repairs to tank barges. A series of selected repairs and repair materials were tested in a laboratory. The purpose of these tests was to develop a ranking of the repairs in order of their relative survivability for each test conducted. The test examined impact, hydrostatic pressure, chemical immersion, and heat values.

The third project concerns the enhancement of the analysis of structures. The analysis is highly complex and uses a computer to mathematically model the physical description of the structure to be analyzed. The results provide the response of the structure to various loadings. In the past, the analysis of one problem typically required the expenditure of about six man weeks of effort due to the volume of paper containing data to be worked over. The project has enhanced the previous method, called finite element analysis, to incorporate further analysis in the computer producing a pictorial form of output. This is known as a graphics orientated finite element analysis (GIFTS). The additional step has reduced the time for a typical structural analysis from the previous six weeks to two days.

The fourth project is concerned with longitudinal strength criteria for Great Lakes vessels over 750 feet long. This investigation centered on stress data collection, analysis and a computer model.

The fifth project deals with liquefied natural gas (LNG) cargo tank design. The intent of this project is to develop a procedure to predict the extreme loading value to be accounted for in the design of the cargo tanks in LNG vessels. The extreme loading values can be obtained after the complex determination of the varying values for the cargoes' acceleration factors, due to ship motion, are predicted. Extreme values of acceleration for the lifetime of a ship are obtained by using a computer program applying short-term statistics to extreme sea condition data collected over many years. Predicted extremes are compared with the suggested (1 October 1972) Chemical Transportation Industry Advisory Committee (CTIAC) design rules. Generally the prediction procedure is used to provide reasonably conservative extreme accelerations appropriate to the design of LNG cargo tanks.

The Coast Guard is also maintaining active participation in the interagency Ship Structures Committee which serves as a focal point for the structure related research conducted by the Navy, Maritime Administration, American Bureau of Shipping, and the Coast Guard.

In the area of flooding, capsizing and foundering, there are currently two research projects that will provide inputs to Title

II regulations. One project is concerned with wave group analysis and capsizing simulations which will be used to develop analytical techniques for predicting the conditions under which a vessel will capsize. This technique will be used to develop sound design standards that will minimize pollution caused by release of shipboard cargoes due to capsizing. The second project is concerned with the damage stability of cargo ships. The purpose of this study is to determine if the presently assumed permeability values for cargo spaces of barge carrying ships and for engine rooms of all ships are valid in doing damage stability calculations on modern vessels. Preliminary results indicate that damage stability standards may have to be revised both internationally and nationally.

In the area of cargo system safety research, the Coast Guard has many current projects that will contribute useful inputs. A review of these projects was presented in the Sixth Annual Report of the Secretary of Transportation on Hazardous Materials Control, 1975, pursuant to Title I, Public Law 93-633.

iii. <u>To reduce damage to the marine environment from normal operation of vessels to which this Title applies</u>.

In the Fourth Title II Report, dated January 1976, the Coast Guard reported on the preparation of proposed rules applicable not only to U.S. vessels but also to foreign vessels entering U.S.

waters. These proposed rules were published in the Federal Register on 15 April 1976 (41 FR 15859) and are contained in Appendix III of this report. These regulations add design, equipment, and operation requirements for sea-going U.S. flag tank vessels (of 150 gross tons or more) engaged in foreign trade and foreign flag tank vessels (of 150 gross tons or more) that enter the navigable waters of the United States. A final environmental impact statement (EIS) on regulations for "U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States," was filed 1 November 1976 with the President's Council on Environmental Quality. The final EIS is included as Appendix IV of this report. A copy of the currently unpublished final rule is attached as Appendix V; publication is in process, scheduled for 13 December 1976.

In addition, on May 13, 1976, the Coast Guard published in the Federal Register an advance notice of proposed rulemaking soliciting comments on the concept of requiring certain existing tank vessels to retrofit a segregated ballast capability. The nearly 100 written comments raised many serious questions and subsequently the Coast Guard contracted for an in-depth study of some of these implications. This study has not been completed yet and therefore no decision has been reached regarding whether to proceed or withdraw the proposal. This issue is also under discussion presently within the Marine Environmental Protection Committee of IMCO.

The Coast Guard is continuing research to provide the United States with approval regulations for oil-water separators, oil content monitors, and oil content alarms which are consistent with international regulations for such equipment. Results to date include draft approval regulations that will be published as proposed rules during the first quarter of 1977.

The first meeting of the new IMCO Subcommittee on Bulk Chemicals was held during the year. The Subcommittee is chaired by the United States (represented by the Coast Guard) and is unique in that it reports to two Committees, the Marine Environment Protection Committee and the Maritime Safety Committee. The Subcommittee is responsible for carrying out the IMCO work concerning the transportation of bulk dangerous cargoes including both liquids and gases. Its work program includes responsibility for the IMCO Codes for the Construction and Equipment of Ships Carrying Bulk Dangerous Chemicals and Bulk Liquefied Gases as well as any work related to Annex II of the 1973 Convention.

During the first session, the Subcommittee on Bulk Chemicals completed a Code for the Construction and Equipment of Existing Gas Ships. The Subcommittee also began work on the items of its work program related to pollution. These are:

(a) evaluation of noxious substances,

(b) preparation of guidelines for the provision of reception facilities required by Annex II of the 1973 Convention,

(c) preparation of procedures and arrangements for the discharge of noxious liquid substances in accordance

with Annex II of the 1973 Convention.

Other IMCO bodies continued their work on items related to the improvement of the safety of vessels. Most notable are the Procedures for the Control of Ships developed by the Maritime Safety Committee. These procedures are directed at identifying substandard ships so that appropriate action can be taken. The Maritime Safety Committee also developed a procedure for including the amount of segregated ballast on the tonnage certificates of tankers meeting the 1973 Convention so that authorities may take it into account when determining the vessel's various port fees.

The Coast Guard has fully supported the work of the above mentioned IMCO bodies as well as all others during the past year. In developing our national inputs into the IMCO work, the Department of State Shipping Coordinating Committee as well as Coast Guard Advisory Committees have been utilized to the fullest extent. The work has also been fully coordinated with the Environmental Protection Agency and MARAD, and often representatives of those agencies have participated as members of the U.S. delegations to the IMCO meetings.

Two sets of regulations, applicable to flammables and combustibles, were issued as proposed rulemakings under the authority of Title II of the Ports and Waterways Safety Act.

Proposed rules for the Carriage of Bulk Dangerous or Extremely Flammable Liquid Cargoes on self-propelled vessels were published in the Federal Register of Thursday, June 24, 1976 (41 FR 43822). These rules are contained in Appendix VI.

The purpose of the rulemaking is to:

a. Improve the safety of new and existing ships, U.S. flag and foreign flag, carrying bulk dangerous chemicals in U.S. waters.

b. Adopt the recommendations of IMCO's Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (Resolution A. 212[VII]).

Proposed rules for Self-Propelled Vessels Carrying Bulk Liquefied Gases were published in the Federal Register of 4 October 1976 (41 FR 26126). These rules are contained in Appendix VII.

The purpose of the rulemaking is to:

a. Improve the safety of new liquefied gas carriers. The regulations apply to foreign flag vessels

operating in U.S. waters, as well as U.S. flag vessels.

b. Adopt the recommendations of IMCO's Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (Resolution A. 328[IX]).

C. To the extent 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 reason therefore.

We have found no areas where we cannot implement required rules and regulations, but we realize that the progress defining rules and regulations for maneuverability and the reduction of the possibility of collisions, groundings and other accidents are moving very slowly because of the complexity of the problem, as has been previously reported.

D. Other Coast Guard Activities Related to the Act.

a. Marine Safety Systems Analysis, consisting of:

(1) A threefold Commercial Vessel Safety Project to develop procedures for estimating costs to affected parties arising from Coast Guard regulatory actions, the evaluation and application of risk assessment methodologies, and the development of a methodology for quantifying the benefits from reductions of marine casualties.

(2) A two-part Port Safety Project to develop a guide for siting of facilities and marine terminals, and a review of methods and practices used by other agencies and governments to improve resource management within the Port Safety Program.

b. Marine Safety Information System

(1) A project is under development to design a computerized Management Information System to serve the diverse needs of the Coast Guard's marine safety efforts. Within the framework of this system is the ability to develop and analyze safety profiles for different class vessels.

c. Personnel Qualifications and Training

In a continuing effort to provide for the protection of the marine environment, regulation changes are being proposed in regard to the licensing and certificating of merchant marine personnel which will establish qualifying criteria for certifying candidates for the carriage and transfer of various categories of dangerous cargoes.

In order to reduce pollution incidents caused by human error, the Coast Guard is proposing that licensed officers no longer be tankermen by virtue of holding a license but must have qualifying training and experience before they may perform service involving transfer of dangerous cargoes. Deck and engineer officers and unlicensed personnel would have to show qualifying service and complete an approved training course, or pass a written Coast Guard examination in order to qualify for the endorsement as 'Tankerman."

Firefighting training will be required for all persons desiring to be certificated as "Tankerman." In addition, applicants for a tankerman endorsement for other than flammable and combustible liquid cargoes must complete a tankerman training course for the endorsement of the cargo desired.

The Coast Guard has recently completed two studies relating to personnel qualifications. These studies are being used in conjunction with establishing guidelines for the development of tankerman courses and evaluation of the courses for Coast Guard approval.

The first study is entitled "Recommendations for Qualifications of Liquefied Natural Gas Cargo Personnel." This study consists of three volumes; volume I is an introduction, while the second and third volumes deal with functional job analysis of tasks for personnel associated with operations of cargo ships and unmanned barges carrying liquefied natural gas.

The second study is entitled "Qualifications Standards for Personnel Responsible for Hazardous or Noxious Chemicals in Bulk." This study is also published in three volumes and, as in the previous one, the first volume is an introduction while the second and third deal with functional job analysis of tasks relative to personnel.

These studies provide a sound basis for the Coast Guard review of schools providing training of personnel in firefighting and hazardous material handling techniques. The schools are invaluable for qualification of seagoing personnel in dealing with the

technological advancements and cargoes representative of today's merchant marine.

d. Marine Investigation

New and additional emphasis has been placed on investigations by finalizing the formation of a division at Coast Guard Headquarters in the Office of Merchant Marine Safety, which is solely dedicated to investigating marine casualties and personnel actions. This reorganization will enable more effective utilization of resources to permit review of a greater number of casualties and an improvement in the thoroughness of review of each report received. The net result of this effort will be to develop the casualty data bank into a more reliable means of identifying causes of marine casualties and the most prudent corrective and preventative actions.

e. Merchant Vessel Inspection

The Coast Guard has published notices of proposed rulemaking as follows:

1. Proposed rules to implement amendments to Regulations 12, 19, and 20 of Chapter 5 of the International Convention for the Safety of Life

at Sea, 1960. These proposed amendments, attached to the 1976 Title II Report to Congress, were an outgrowth of a study by IMCO of the disastrous Torrey Canyon foundering on 18 March 1967. The amendments will require vessels of 1,600 gross tons and over in ocean and coastwise service to be fitted with a radar, radio direction finding apparaturs, gyro compass, and echo sounding device. Conditions of vessel operation while under the control of an automatic pilot are also specified. In addition to the specific navigational equipment requirements for vessels of 1,600 gross tons and over, all ships subject to the International Convention for the Safety of Life at Sea, 1960, must carry adequate and up-date charts, sailing directions, lists of lights, notices to mariners, tide tables and other nautical publications necessary for the intended voyage. The final rules are presently in preparation.

2. The Coast Guard published proposed regulations in the Federal Register on 13 August 1976 (41 FR 33996) prohibiting the accumulation of cargo in cargo handling rooms and prohibiting the installation of

air compressors in cargo handling rooms and cargo areas. These proposed rules were issued following the Commandant's Action on the Marine Board of Investigation of the SS TEXACO NORTH DAKOTA. The Commandant's action concluded that cargo that leaks or is drained or spilled into a pump room bilge poses a hazard to the vessel and its personnel and makes the operation of an air compressor in the pump room hazardous. It has been determined further that cargo that leaks or is drained or spilled into a bilge of any cargo handling room poses a hazard and that operation of an air compressor in or adjacent to any cargo area on a tank vessel likewise poses a hazard. Comments have been received concerning the proposed rules, which are included as Appendix VIII to this report, and final rules are currently being drafted.

3. A formal investigation into the explosion and fire on board the tank barge ATC 3060, O.N. 512289, which occurred on 17 March 1975, revealed that proper identification of the grade of cargo transferred to the barge from the SS AMOCO YORKTOWN (of Liberian registry) could have alerted the repair

crew aboard the barge to the inherent dangers associated with carriage of the cargo. Information concerning the grade of cargo being transferred could have been obtained from the shipping papers. Consequently, the Coast Guard has issued proposed rules making certain portions of the tank vessel regulations applicable to foreign flag tank vessels. The section proposed to be applicable to foreign tank vessels is 46 CFR 35.01-10. It speaks to required shipping documents giving the name of the cosignee and location of the delivery point, the kind, grades, and approximate quantity of each kind and grade of cargo, and for whose account the cargo is being handled. These proposed rules were published in the Federal Register Thursday, September 2, 1976 (41 FR 37119) and are attached as Appendix IX, to this report.

F. Fire and Explosion Prevention and Protection

Research and Development efforts in fire and explosion prevention are continuing. There have been several projects conducted. The largest project concerned an assessment of "Fire Safety Aboard LNG Vessels." The primary purpose of the program

APPENDIX I - NAVIGATION SAFETY REGULATIONS
(41 FR 18766-18771)

federal register

THURSDAY, MAY 6, 1976

PART III:

DEPARTMENT OF TRANSPORTATION

Coast Guard

■

NAVIGATION SAFETY REGULATIONS

developmental stage. The requirement has been deleted from the proposed regulations and replaced with a requirement in proposed § 164.35(j) to have equipment in the pilothouse to plot relative motion of vessels. The Coast Guard is continuing to study possible requirement of radar anti-collision devices.

e. Five commenters objected to the proposal to require a vessel to maintain a plot of its movement and lay out a trackline of intended vessel movement. The objections were that it is not possible to follow the intended trackline, that this additional work would distract the operator from observing passing aids to navigation, and that a plot is not useful in many circumstances such as while navigating in a narrow channel. While these objections may be valid with respect to some small vessels with limited crews, these vessels have been removed from the scope of the proposed rules. These operational practices are considered necessary and practical for vessels of 1,600 gross tons and over and are in fact followed by most such vessels.

f. Four commenters objected to the requirement to test vital equipment before entering or getting underway in U.S. navigable waters. The commenters felt that testing is not necessary since equipment malfunctions will be detected in normal operation. The testing requirements have been retained and are set forth in proposed § 164.25. Much of the equipment tested is not used during a long sea voyage or during periods between voyages and its availability for use is essential for safe inshore navigation.

g. Four commenters suggested that to ensure uniformity the Coast Guard should postpone issuance of regulations until international standards have been developed. The Coast Guard has determined that because of the severity of the hazards with which these regulations are concerned a postponement is not appropriate. Any inconsistencies between the regulations proposd in this notice and subsequently developed international standards covering the same subject matter will be resolved as they occur.

The issue of whether regulations should be developed currently or delayed until international standards are formulated was discussed recently at the National Symposium on Marine Transportation Management. There was considerable support expressed at the symposium for issuing regulations immediately.

Other comments on the advance notice are contained in following paragraphs that explain specific, proposed requirements.

Authority. The regulations proposed in this notice would be issued under the authority of Title I and Title II of the Ports and Waterways Safety Act of 1972 (Pub. L. 92-340, 86 Stat. 424 (33 U.S.C. 1224, 46 U.S.C. 391a)) as delegated to the Commandant of the Coast Guard in 49 CFR 1.46 (n) and under the authority of the Federal Water Pollution Control Act (Pub. L. 92-500, 86 Stat. 862 (33 U.S.C. 1321)) as delegated to the Commandant in 49 CFR 1.46(m).

The policies and purposes of these acts were discussed in the advance notice and are restated again as follows:

"Senate Report No. 92-724 (March 28, 1972) states that the purpose of the Ports and Waterways Safety Act of 1972 (Pub. L. 92-340, 86 Stat. 424) is to promote the safety and protect the environmental quality of ports, waterfront areas, and the navigable waters of the United States. Broad authority is granted by Title I of the Act to establish, operate, and maintain vessel traffic services and systems for ports, harbors, and other waters subject to congested vessel traffic and 'control vessel traffic in areas determined to be especialy hazardous, or under conditions of reduced visibility, adverse weather, vessel congestion, or other hazardous circumstances' in order to 'prevent damage to, or the destruction or loss of any vessel, bridge, or other structure on or in the navigable waters of the United States, or any land structure or shore area immediately adjacent to those waters; and to protect the navigable waters and the resources therein from environmental harm resulting from vessel or structure damage, destruction, or loss * * *'.

"In addition, Title II of the Ports and Waterways Safety Act of 1972 authorizes comprehensive regulations for the design, construction, alteration, repair, maintenance, and operation of tankers and certain other vessels. The reason stated for this provision of the Act is as follows: '[T]he carriage by vessels of certain cargoes in bulk creates substantial hazards to life, property, the navigable waters of the United States (including the quality thereof) and the resources contained therein * * * [and] existing standards for the design, construction, alteration, repair, maintenance, and operation of such vessels must be improved for the adequate protection of the marine environment.'

"The Federal Water Pollution Control Act (86 Stat. 862, 33 U.S.C. 1321(b)(1)) states the policy of the United States as follows: '[T]here should be no discharges of oil or hazardous substances into or upon the navigable waters of the United States, adjoining shorelines or into or upon the waters of the contigous zone.' Regulations issued under the authority of section 311(j) of this Act are required to be consistent with maritime safety and navigation laws."

Discussion of proposed regulations. Proposed § 164.11 expands considerably on the requirements proposed in the advance notice. However, the items proposed simply codify existing practices traditionally employed by prudent navigators and ship handlers. Publication of these fundamentals of navigation would not be necessary except that some vessels do not currently follow these practices. Also, some court decisions involving litigation arising from vessel casualties have reflected tolerance of substandard navigation practices leading to the casualties.

Section 164.11(a) and (b) require that the pilothouse of a vessel underway be manned with competent personnel assigned by the master or person in charge to direct and control the movement of the vessel and to fix the vessel's position. The term "adequate number" as used in §§ 164.11(a) and in 164.15(b) means enough personnel to perform all the necessary functions in the pilothouse and the engine room. The term "competent" as used in §§ 164.11(b) and in 164.15(b) means appropriately licensed or certificated with the ability and knowledge to do the job.

Section 164.11 (c) and (d) require that a vessel's position be fixed at intervals of at least every 15 minutes and that the fix, and if necessary the intended track, be plotted each time a fix is obtained. The 15 minute maximum time lapse between fixes was selected because the course made good at typical speeds of advance normally will allow time to compensate for set and drift. Longer times between fixes increase the probability of hazardous deviations from the intended track. Conversely, operation in shoal waters or channels or in conditions of strong wind or current or operations at high rates of speed require even more frequent fixes to ensure that the vessel is not standing into danger.

Section 164.11 (e) and (f) require the use of available electronic and other positioning equipment and references, including external fixed aids, and incorporate a prohibition against using buoys alone as a means of fixing the vessel's position.

Section 164.11(g) requires the master or person in charge to ensure that a proper lookout is maintained. A proper lookout is one of the most effective safety measures that can be used on board a vessel, since it is well known that radar can fail to detect small contacts or "lose" them in sea return or in a profusion of contacts. The term "proper" in § 164.11 (g) means an individual who is assigned exclusively to perform the duties of the lookout, who has adequate communication with the pilot house, who is placed in the most advantageous position to act as a lookout, who has adequate training, adequate hearing, adequate vision, and is not color blind.

Section 164.11(h) requires the evaluation of each closing visual and radar contact. Risk of collision must be continually evaluated in order to take timely evasive action if necessary. Several vessels may pose a threat at one time. All must be considered by the person directing the movement of the vessel. Tracking and evaluation may require computation of course, speed, and closest point of approach (though observation of bearing change may often suffice) but all closing contacts introduce risk of collision and the risks should be continually assessed until they no longer pose a threat to the vessel.

Section 164.11 (i) and (j) require the master or person in charge to ensure that rudder orders and engine speed and direction orders are executed as given. The misapplication or reversal orders to helm and engines are findings that appear regularly in accident reports. There are several factors which contribute to errors in execution of these orders. Some of the factors include careless or incompetent personnel, bridge design (which often places the person issuing orders some distance from the helm or annunciator, background noise which can garble an order, and an unfamiliar dialect or language which can confuse or mislead the helmsman. The master should examine his vessel and crew to determine

the existence of possible problem areas. If problems exist, he should take action to remedy them.

Section 164.11(k) requires the person directing the movement of the vessel to have knowledge of and to apply correctly variation and deviation in magnetic compasses and gyro compass error. The recently conducted Coast Guard study contains observations that many vessels have outdated deviation tables and that correct variation is frequently not readily available for rapid application to the magnetic course should the gyro compass fail. Gyro compass errors have also been observed to be unavailable or incorrectly applied.

Section 164.11(l) requires a qualified helmsman to be at the steering position at all times. This procedure is basic when using "hand" steering, but it is equally important when navigating in the automatic mode. Use of the auto pilot does not provide sufficient control in coastal and harbor waters due to the proximity of natural hazards and vessel congestion and does not permit prompt response necessary to shift rapidly from automatic to manual or hand steering.

The pilot-master conference required in proposed § 164.11(m) would minimize misunderstandings. Although the pilot is of course qualified, every vessel has its own peculiarities which frequently are known only to the crew and which often vary with draft, speed, trim, and sea state. Similarly, every channel and harbor is unique. A short explanation by the pilot of unusual navigation or maneuvering techniques necessary for safe navigation in the waterway will help to ensure the close cooperation required by the pilot and master in maneuvering the vessel, particularly if emergency action becomes necessary.

Section 164.11 (n), (o), and (p) requires the person directing the movement of the vessel to know the current, predicted set and drift, and tides for the area to be transited. Prediction of tide and current values and resultant set and drift are routine on most vessels. However, it is essential that all vessels and particularly deep draft vessels avoid any possibility of grounding. The prediction of adverse conditions would alert the master to delay proceeding until conditions were favorable.

Section 164.11(q) will eventually contain requirements for "Minimum Net Bottom Clearance." These requirements will be further developed as a notice of proposed rulemaking upon receipt of comments requested by the advance notice of proposed rulemaking on this subject (CGD 76-051) which is published separately in this issue of the FEDERAL REGISTER.

Section 164.11(r) requires the master or person in charge of a vessel underway to ensure that the anchor is ready for letting go.

Section 164.11(s) and (t) require the proper use and employment of light signals, day shapes, and fog signals in accordance with the appropriate "Rules of the Road". These items function to provide a warning of a vessel's presence and give an indication of its size and maneuverability. There have been numerous incidents in which inattention to these precautions have resulted in collisions.

Section 164.11(u) enumerates the conditions which should be considered in determining the most prudent speed at which a vessel should proceed. Regard for these factors will minimize hazard to both the vessel and the area it transits.

Section 164.15 proposes additional requirements for vessels underway in confined or congested waters. The requirements include—

(1) placing the propulsion machinery in the maneuvering mode;

(2) ensuring that the engine room is manned by an adequate number of competent persons to operate the vessel in the maneuvering mode;

(3) ensuring that persons are available for rapid anchoring in an emergency;

(4) manning the steering engine room;

(5) ensuring that the person manning the steering engine room is in communication with the pilothouse; and

(6) ensuring that the automatic pilot device is not in use. These requirements are essential to provide appropriate rapid response to emergency situations. In confined or congested waters there is little time for taking action in the event of an equipment failure or when rapid response is required to avoid a collision or grounding.

Section 164.16 is reserved for a list of confined or congested waters. The criteria for designation of certain areas as "confined or congested" are under development and will be published as a notice of proposed rulemaking.

Section 164.17 is reserved for regulations concerning "Tug Assistance in Confined Waters." This concept is presented in an advance notice of proposed rulemaking published in this issue of the FEDERAL REGISTER (CGD 76-025).

Section 164.19 contains requirements for vessels at anchor. These requirements are considered the minimum steps necessary to ensure the safety of vessels and structures in and around anchorages. Recent incidents in vessel anchorages, some of which have led to casualties, highlight the need for these requirements.

Section 164.23 requires the Captain of the Port or the appropriate vessel traffic service to be notified before a vessel gets underway in reduced visibility or when current, wind, or tide may abnormally affect the vessel's movements. This proposed requirement is informational only. The information will allow the Captain of the Port to advise mariners of any known hazards, existing or anticipated, which may be encountered upon getting underway.

Section 164.25 requires certain tests of navigation and control systems before entering or getting underway in the navigable waters of the United States.

Section 164.30 requires the possession of up-to-date charts and appropriate nautical publications for the area being transited. Seven commenters responding to the advance notice objected to the proposed requirements to maintain up-to-date charts and publications. Commenters who are operators of seagoing vessels contended that U.S. charts and publications are difficult to obtain while in foreign areas. The rule allows use of either current foreign charts and publications or the most recently obtainable U.S. charts and publications. Thus, a vessel in foreign trade could obtain charts and publications in a foreign port which would comply with the regulations. Appropriate charts and publications are basic to the safe navigation of all vessels; accordingly, this requirement has been retained.

Section 164.35 delineates equipment requirements for all vessels, including requirements to have a marine radar, gyro compass, magnetic compass with appropriate deviation tables, illuminated rudder angle indicator, a table of maneuvering and speed characteristics, a depth sounder and recorder, speed indicator, and equipment for plotting relative motion. The requirement in proposed § 164.35(e) for a rudder angle indicator is considered essential to enable the person directing the movement of the vessel to monitor compliance with helm orders, to be reminded of rudder position, and to aid in evaluating helm response. The display of characteristic vessel responses to helm and engines proposed in § 164.35 (f), including such information as acceleration and deceleration tables, turning radii at various speeds and standard rudder angles, is proposed to provide a quick reference for pilots and ship's officers.

Three commenters on the advance notice objected to the proposed requirement for an echo sounding device as not being necessary. It is necessary that a minimum net bottom clearance be retained at all times. Thus, the requirement is considered to be essential and has been retained. Similarly, four commenters considered a depth recorder to be of little value. Bottom profiles for comparison with the vessel's track are useful aids in both establishing and verifying a vessel's position and are considered to be most valuable to the inshore navigator. This requirement has therefore been retained.

Six commenters objected to the proposed requirement in the advance notice for a speed indicating device. This requirement has been modified in § 164.35 (i) to permit either a direct reading device or the use of revolutions per minute (RPM) indicators provided that they are accompanied by speed equivalent tables.

As previously stated, six commenters objected to the requirement proposed in the advance notice for "collision avoidance" radar. This requirement has been replaced by the requirement in proposed

§ 164.35(j) to have equipment for plotting relative motion available in the pilot house.

Section 164.37 requires that each vessel of 10,000 or more gross tons have a second marine radar in addition to the radar required by § 164.35(a). On a vessel of this size, loss of radar capability imposes an unacceptable risk factor. Therefore, the requirement has been retained although three commenters on the advance notice were in opposition.

The requirements that the radars have "S-band" (10 centimeters) capability and "X-band" (3 centimeters) capability have been dropped. The Coast Guard agrees with the seven commenters on the advance notice who maintained the requirements for both "S-band" and "X-band" capability are not appropriate. S-band radars are becoming less common on U.S. waters and U.S. installed RACONS may be used only with X-band equipment.

Section 164.39 requires each vessel of 35,000 gross tons or more to have a rate of turn indicator on the bridge. A rate of turn indicator provides the person directing the movement of the vessel with information on heading change before the swing can be detected visually or by compass. The device is therefore considered to be essential for a vessel of this size.

Section 164.51 authorizes deviations in an emergency from any rule in this part to the extent necessary to avoid endangering persons, property, or the environment. The section also requires the deviation to be reported to the nearest Captain of the Port or District Commander as soon as possible if the deviation must continue for more than a very brief time.

Section 164.53 provides for deviations from the rules in this part in other than emergency situations when authorized by the Captain of the Port. This section recognizes that routine deviations may be necessary and appropriate in the event of equipment failure or because of the particular service or locale of the vessel.

An environmental assessment has been conducted for these proposed regulations.

In consideration of the foregoing, it is proposed to amend Chapter I of Title 33, Code of Federal Regulations, by adding new Part 164 as follows:

PART 164—NAVIGATION SAFETY REGULATIONS

Sec.

164.01 Applicability.
164.11 Navigation underway: general.
164.15 Navigation underway: confined or congested waters.
164.16 List of confined or congested waters.
164.17 Tug assistance in confined waters.
164.19 Requirements for vessels at anchor.
164.23 Notification of getting underway.
164.25 Tests before entering or getting underway.
164.30 Charts, publications and equipment: general.
164.33 Charts and publications.
164.35 Equipment: all vessels.
164.37 Additional equipment: vessels of 10,000 or more gross tons.
164.39 Additional equipment: vessels of 35,000 or more gross tons.
164.51 Deviations from rules: emergency.
164.53 Deviation from rules: other than emergency.
164.61 Marine casualty record retention.

AUTHORITY: Sec. 311(j)(1), 86 Stat. 826 (33 U.S.C. 1321(j)(1)); sec. 201(3), 86 Stat. 428, as amended (46 U.S.C. 391a(3)); sec. 104, 86 Stat. 427 (33 U.S.C. 1224); 49 CFR 1.46(m) and (n)(4).

§ 164.01 Applicability.

This part applies to each self-propelled vessel of 1600 or more gross tons when it is operating in or on the navigable waters of the United States, except the Panama Canal and the St. Lawrence Seaway.

§ 164.11 Navigation underway: general.

The master or person in charge of each vessel underway shall ensure that:

(a) The pilothouse is constantly manned by an adequate number of persons to:

(1) Direct and control the movement of the vessel; and

(2) Fix the vessel's position;

(b) Each person performing a duty described in paragraph (a) of this section is competent to perform that duty;

(c) The vessel's position is fixed at least every 15 minutes;

(d) The position of the vessel at each fix, and the revised intended track of the vessel if necessary, are plotted on a chart of the area and the person directing the movement of the vessel is informed of the vessel's position.

(e) Electronic and other navigational equipment, external fixed aids to navigation, geographic reference points, and hydrographic contours are used when fixing the vessel's position;

(f) Buoys alone are not used to fix the vessel's position;

NOTE: Buoys are aids to navigation placed in approximate positions to alert the mariner to hazards to navigation or to indicate the orientation of a channel. Buoys may not maintain an exact position because strong currents, heavy seas, ice and collisions with vessels can move or sink them or set them adrift. Although buoys may corroborate a position fixed by other means, buoys cannot be used to fix a position. (See standard texts on nautical navigation practice such as Bowditch, Dutton, and Reisenberg.)

(g) A proper lookout is maintained;

(h) The danger of each closing visual or each radar contact is evaluated and the person directing the movement of the vessel knows the evaluation;

(i) Rudder orders are executed as given;

(j) Engine speed and direction orders are executed as given;

(k) Magnetic variation and deviation and gyro compass errors are known and correctly applied by the person directing the movement of the vessel;

(l) A person whom he has determined is qualified to steer the vessel is at the steering position at all times;

(m) If a pilot other than a member of the vessel's crew is employed—

(1) The pilot is informed of the maneuvering characteristics and peculiarities of the vessel and of any abnormal circumstances on the vessel that may affect its safe navigation; and

(2) The master or person in charge of the vessel is informed by the pilot of abnormal characteristics of the area to be transited that may affect the vessel's safe navigation and of non-routine maneuvers before the pilot makes them.

(n) Current values for the area to be transited are known by the person directing the movement of the vessel;

(o) Predicted set and drift are known by the person directing movement of the vessel;

(p) Tide values for the area to be transited are known by the person directing movement of the vessel;

(q) (Reserved)

Reserved for "Minimum Net Bottom Clearance." (To be developed.)

(r) The vessel's anchors are ready for letting go;

(s) Proper lights and day signals are displayed;

(t) Proper fog signals are sounded;

(u) The person directing the movement of the vessel sets the vessel's speed with consideration for—

(1) The prevailing visibility and weather conditions;

(2) The proximity of the vessel to fixed shore and marine structures;

(3) The tendency of the vessel underway to squat and suffer impairment of maneuverability when there is small underkeel clearance;

(4) The proportions of the vessel and the channel;

(5) The density of marine traffic;

(6) The damage that might be caused by the vessel's wake;

(7) The strength and direction of the current; and

(8) Any local vessel speed limit;

(v) The tests required by § 164.25 are made and recorded in the vessel's pilot house log; and

(w) The equipment required by this part is maintained in operable condition.

§ 164.15 Navigation underway: confined or congested waters.

In the confined or congested waters described in § 164.16, the master or person in charge of each vessel underway shall ensure that—

(a) Propulsion machinery is in the maneuvering mode;

(b) The engine room is manned by an adequate number of competent persons to operate the vessel in the maneuvering mode;

(c) Persons are available for rapid anchoring in an emergency;

(d) The steering engine room is manned to shift steering control from the pilot house to the steering engine room;

(e) The person required by paragraph (d) of this section is in communication with the pilot house;

(f) The automatic pilot device is not in use.

§ 164.16 List of confined or congested waters.

To be developed.

§ 164.17 Tug assistance in confined waters.

To be developed.

§ 164.19 Requirements for vessels at anchor.

The master or person in charge of each vessel that is anchored shall ensure that:

(a) Procedures are followed to detect a dragging anchor;

(b) A proper lookout is maintained;

(c) If an anchor drags, action is taken to ensure the safety of the vessel, structures, and other vessels;

(d) The vessel is ready to get underway whenever weather, tide, or current conditions are likely to cause its anchor to drag;

(e) Proper lights and day signals are displayed; and

(f) Proper fog signals are sounded.

§ 164.23 Notification of getting underway.

Whenever the visibility is less than 300 yards or whenever current, wind, or tide may abnormally affect the vessel's movement, no person may cause a vessel to get underway from an anchorage established by the Coast Guard or a berth or pier unless the Captain of the Port or the vessel traffic service for that area has been notified that the vessel is getting underway.

§ 164.25 Tests before entering or getting underway.

No person may cause a vessel to enter or get underway on the navigable waters of the United States unless, no more than 12 hours before entering or getting underway, the following equipment has been tested:

(a) Normal and secondary steering gear.

(b) All internal vessel control communications and vessel control alarms.

(c) Each emergency generator for at least fifteen minutes.

(d) The storage batteries for emergency lighting and power systems in vessel control and propulsion machinery spaces.

(e) Main propulsion machinery, ahead and astern.

§ 164.30 Charts, publications and equipment: general.

No person may operate or cause the operation of a vessel unless the vessel has the charts, publications, and equipment required by §§ 164.33 through 164.39 of this part.

§ 164.33 Charts and publications.

(a) Each vessel must have the following:

(1) Charts of the area transited that:

(i) Are of a large enough scale and have enough detail to enable safe navigation of the area;

(ii) Are the most recent published for the area and corrected; and

(iii) Are published by the National Ocean Survey, U.S. Army Corps of Engineers, or a river authority. (See also paragraph (b) of this section.)

(2) The current corrected copy of, or applicable extract from, each of the following publications, if it includes the area being transited:

(i) U.S. Coast Pilot.

(ii) Coast Guard Light List.

(iii) Notices to Mariners published by Defense Mapping Agency Hydrographic Center and local Coast Guard Notice to Mariners.

(iv) Tide Tables published by the National Ocean Survey.

(v) Tidal Current Tables published by the National Ocean Survey, or river current publication issued by the U.S. Army, Corps of Engineers, or a river authority.

(b) A vessel may have a chart or publication published by a foreign government instead of a chart or publication required by this section if the chart or publication contains similar information to the U.S. Government publication or chart. A vessel bound from a foreign port to a port in the United States may have the latest charts and publications that were available at previous ports of call.

§ 164.35 Equipment: all vessels.

Each vessel must have the following:

(a) A marine radar system for surface navigation.

(b) An illuminated magnetic steering compass mounted in a binnacle that can be read at the vessel's primary steering position.

(c) A current magnetic compass deviation table or graph for the steering compass, in the pilot house.

(d) An illuminated gyro compass or repeater that can be read at the vessel's primary steering station.

(e) An illuminated rudder angle indicator in the pilot house.

(f) A diagram, graph, or table, that shows the vessel's maneuvering and speed characteristics, in the pilot house.

(g) An echo depth sounding device that can be read in the pilot house.

(h) A device to continuously record the depth readings of the vessel's echo depth sounding device.

(i) An illuminated device in the pilot house that displays the speed of the vessel, such as a pitometer log, revolutions-per-minute counter with speed equivalent table or a direct read-out device such as a doppler indicator.

(j) Equipment in the pilot house for plotting relative motion.

§ 164.37 Additional equipment: vessels of 10,000 or more gross tons.

Each vessel of 10,000 or more gross tons must have, in addition to the radar system required in § 164.35(a), a second marine radar system for surface navigation.

§ 164.39 Additional equipment: vessels of 35,000 or more gross tons.

Each vessel of 35,000 or more gross tons must have an illuminated rate of turn indicator in the pilot house.

§ 164.51 Deviations from rules: emergency.

(a) In an emergency, any person may deviate from any rule in this part to the extent necessary to avoid endangering persons, property, or the environment.

(b) When a person must continue to deviate from any rule in this part because of an emergency, he shall report the deviation or cause it to be reported to the nearest Captain of the Port or Coast Guard District Commander as soon as possible.

§ 164.53 Deviations from rules: other than emergency.

(a) Any person may deviate from any rule in this part when authorized by the Captain of the Port.

(b) The Captain of the Port may authorize a deviation from any rule in this part if he determines that the deviation does not impair the safe navigation of the vessel and will not result in a violation of the rules for preventing collisions at sea. The authorization may be issued for any voyage or part of a voyage or, if the vessel operates solely in waters under the jurisdiction of the Captain of the Port, for any continuing operation or period of time the Captain of the Port specifies.

§ 164.61 Marine casualty record retention.

When a vessel is involved in a marine casualty as defined in 46 CFR 4.03-1, the master or person in charge of the vessel shall:

(a) Ensure compliance with 46 CFR Subpart 4.05, "Notice of Marine Casualty and Voyage Records;" and

(b) Ensure that the voyage records required by 46 CFR 4.05-15 are retained for:

(1) 30 days after the casualty if the vessel remains in the navigable waters of the United States; or

(2) 30 days after the return of the vessel to a United States port if the vessel departs the navigable waters of the United States within 30 days after the marine casualty.

Dated: May 3, 1976.

R. I. PRICE,
U.S. Coast Guard Chief, Office of Marine Environment and Systems.

[FR Doc.76-13209 Filed 5-5-76;8:45 am]

[33 CFR Part 164]

[CGD 76-025]

TUG ASSISTANCE IN CONFINED WATERS

Proposed Minimum Standards

The Coast Guard is considering amending Part 164 of Title 33, Code of Federal Regulations to require minimum standards for tug assistance for vessels operating in confined waters to reduce the potential for collisions, rammings, and groundings in these areas.

This advance notice of proposed rulemaking is being issued pursuant to the Coast Guard's policy of soliciting comments from the maritime industry in an

effort to identify a definite course of action and obtain data necessary for the promulgation of an effective regulation.

Interested persons are requested to assist the Coast Guard by submitting written comments, data, views, or arguments to the Executive Secretary, Marine Safety Council (G-CMC/81), room 8117, U.S. Coast Guard, Washington, D.C. 20590. A participant in this rulemaking procedure should furnish comments, views, data, or arguments to the Coast Guard as soon as possible but no later than July 6, 1976. Copies of material received will be available for examination in room 8117. There is no public hearing contemplated at this time. If it is determined to be in the public interest to proceed further after consideration of the available data and comments received in response to this notice, a notice of proposed rulemaking will be issued.

The proposed rules are intended to provide uniform guidance for the maritime industry and Captains of the Port for the use of tugs by vessels operating and maneuvering in confined waters and in docking and undocking. In the development of the requirements for these rules, the following are some of the factors to be considered:

a. Size of vessel,
b. Displacement,
c. Propulsion,
d. Availabllity of multiple screws or bow thrusters,
e. Controllability as measured by standard 20°/20° zig-zag maneuvers,
f. Type of cargo,
g. Availability of safety standards,
h. Actual or predicted adverse weather conditions.

Based on these and possibly other variables, we are considering establishing a "Factor Table" that would rate a vessel numerically. In conjunction with that, a "Tug Assistance Requirement Table" is being considered that would convert the vessel rating to a minimum tug requirement with additional consideration as to the port area being navigated. Where tugs would be referred to in numbers, a rating unit would have to be established such as a minimum rated bhp of available propulsive power.

Comments are specifically requested on the following areas of interest:

1. Should minimum requirements be set as to vessel size, gross tonnage? If so, what?

2. Should vessel propulsion be considered? If so, how?

3. To what extent should multiple screws or bow thrusters be considered?

4. Is controllability as measured by the standard 20°/20° zig-zag maneuvers a factor that should be considered? Is there another measure which would be more suitable in determining controllability?

5. For dangerous cargoes such as those specified in 33 CFR 124.14, what additional requirements should be established, if any?

6. Are there certain safety standards that could be considered to reduce the number of drugs to be required? If so, what are they and to what degree should they be considered?

7. Is there any need to consider adverse weather conditions or should it be left to the discretion of the Captain of the Port?

8. In attempting to categorize ports and their accesses, what standards if any, should be established for channel dimensions, bottom composition, bands, currents, piers, bridges or other impediments to navigation, amount and type of shipping? What other considerations?

9. For defining a tug unit, what minimum rated bhp should be used? Should some other minimum factor be used?

10. In some other alternative possible that would achieve the desired results?

Comments are welcome on these questions, as well as any other additional recommendation for implementing the objective of port and vessel safety.

This advance notice of proposed rulemaking is issued under the authority of sections 104 and 201(R.S. 4417a(3)) of the Ports and Waterways Safety Act of 1972 (Pub. L. 92-340, 86 Stat. 424), as delegated in 49 CFR 1.46 (n) (4); section 311 (j) of the Federal Water Pollution Control Act, (Pub. L. 92-500, 86 Stat. 862, 33 U.S.C. 1321), as delegated in section 2 of E. O. 11735 (38 FR 21243) and 49 CFR 1.46(m); and the National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C. 4231, et seq.).

Dated: May 3, 1976.

R. I. PRICE,
Chief, Office of Marine Environment and Systems.

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[33 CFR Part 164]

[CGD 76-051]

MINIMUM NET BOTTOM CLEARANCE

Request for Comments

The Coast Guard is considering amending Part 164 to require the master of a vessel to ensure that there is a minimum net bottom clearance to prevent vessel damage and possible environmental harm.

Interested persons are invited to participate in the making of the proposed rule by submitting written data, views or arguments as the they may desire to the Coast Guard (G-CMC/81), Washington, D.C. 20590. Each person submitting coments should identify the notice number (CGD 76-051) and the name, address and organization, if appropriate, of the commenter.

All comments received by July 6, 1976, will be fully considered and evaluated before taking action on the proposed rule. Copies of all written communications received will be available for examination by the public in room 8117, 400 Seventh Street, SW, Washington, D.C. The proposal contained in this notice may be changed in the light of comments received. If it is determined to be in the public interest to proceed further after consideration of the available date and comments received in response to this notice, a notice of proposed rulemaking will be issued.

Minimum net bottom clearance (also known as net underkeel clearance) is not a new concept. The Permanent International Association of Navigation Congresses, IInd International Oil Tankers Commission (1970-1974) in their paper "Big Tankers and their Reception" defined net underkeel clearance as "the minimal margin remaining under the keel of the vessel moving at planned passage speed under the action of the most severe planned (anticipated) tolerable wind and wave conditions." This organization has recommended 1 meter as the net underkeel clearance for rocky bottoms and 0.5 meter for sandy bottoms.

This notice proposes that there be established a minimum net bottom clearance for vessels coming into U.S. ports similar to the net underkeel clearance required in various foreign ports. The Coast Guard is seeking information to help develop reasonable requirements or factors that should be considered in the development of practical requirements. Factors under consideration which can diminish the at-rest bottom clearance under actual operating conditions include water level, water density, squat, trim, list and wave action.

Comments are specifically requested on the following:

1. What should be the minimum net bottom clearance?

2. What should be the clearance where the nature of the bed is such as to be capable of rupturing a vessel's bottom?

3. Is there any definition of channel depth other than the latest information published by the United States Government which can be reliably and consistently used?

4. Would an overall specification of permissable depth draft ratio be preferable to the categorized approach set forth in the foregoing?

5. Should vessels with complete double bottom integrity, not containing pollutants within the double bottoms, be permitted to operate with less net bottom clearance than other vessels not so equipped? If so, what should the net bottom clearances be?

Comments are welcome on these questions and suggestions, as well as any adidtional recommendation concerning minimum net bottom clearance.

(Sec. 311 (j)(1), 86 Stat. 8662 (33 U.S.C. 1321 (j)(1)); sec. 201(3), 86 Stat. 427, as amended 46 U.S.C. 391(3)); 49 CFR 1.46 (m) and (n)(4))

Dated: May 3, 1976.

R. I. PRICE,
Chief, Office of Marine Environment and Systems.

[FR Doc.76-13211 Filed 5-5-76;8:45 am]

APPENDIX II - RULES AND REGULATIONS FOR THE PROTECTION OF THE MARINE ENVIRONMENT RELATING TO TANK VESSELS CARRYING OIL IN DOMESTIC TRADE (41 FR 1479)

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THE NATIONAL ARCHIVES OF THE UNITED STATES * 1934 *

Title 33—Navigation and Navigable Waters

CHAPTER I—COAST GUARD, DEPARTMENT OF TRANSPORTATION

[CGD 75-201]

PART 157—RULES AND REGULATIONS FOR PROTECTION OF THE MARINE ENVIRONMENT RELATING TO TANK VESSELS CARRYING OIL IN DOMESTIC TRADE

Tank Vessels Carrying Oil in Domestic Trade

The purpose of these amendments to the oil pollution regulations is to add requirements for the distribution of segregated ballast in certain seagoing U.S. tankships and barges certified to carry oil in the domestic U.S. trade.

In the October 14, 1975, issue of the FEDERAL REGISTER (40 FR 48239) the Coast Guard proposed specific criteria for the distribution of segregated ballast required in section 33 CFR 157.09. In response to several requests for additional time to comment on the proposal, the comment period was extended from November 13, 1975, to December 1, 1975, by a notice published in the FEDERAL REGISTER (40 FR 54006) on November 20, 1975.

The limited issue of this rulemaking action is "What distribution of segregated ballast spaces required for new tank vessels of 70,000 DWT and over will result in the best improvement in environmental protection with no compromise of overall safety?" Safety, for the purposes of the issue of this rulemaking action, is an all inclusive term that includes environmental protection as one aspect. The rules recently issued in part 33 CFR 157 (40 FR 48280), while primarily concerned with abatement of operational pollution, also will be effective in abating pollution in accidents where the more stringent subdivision and damage stability requirements and tank size limits operate to reduce outflows of oil or prevent the total loss of a ship and its oil cargo. The distribution of required segregated ballast spaces in accordance with rules in this amendment will also reduce outflow of oil from a tanker in case of accident. Tank vessel accidents are statistically small in number involving random, unpredictable events. The number of accidents that result in spillage is even smaller, on the order of one-fourth of the accident events. Further, accident analysis shows that about 80

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percent of the oil pollution outflow is caused by approximately 2 percent of the accidents. Several commenters suggested that all very large spills and accidents where the vessels ultimately sank should be withdrawn from the data base, leaving only smaller spills. This approach is not considered sound for two reasons: (1) it rests on the assumption that nothing could be done which would have altered the outcome of those events, and (2) those events by their very magnitude are most deserving of attention.

Several commenters stated that oil spilled from accidents is severely harmful to the marine environment. Because many accidents occur in near-shore areas these commenters suggested that a higher degree of built-in vessel protection against spillage is warranted. It is appropriate to review the history of where oil has been deemed to fit on the relative scale of risk posed to the general public and the port areas, to the vessel and its crew, and to the environment. The Coast Guard has regulated liquid cargo vessels for a number of years by establishing (with the assistance of the National Academy of Sciences) categories of cargo based upon the potential hazards and has required more stringent design and construction features for the vessels as the hazard category of the cargo increased. This methodology has been successful in service as is evidenced by the results shown in the joint MARAD-Coast Guard Tank Barge Study which was referred to by several commenters. The United States has been successful in having this methodology adopted internationally through the deliberations of the Inter-Governmental Maritime Consultative Organization (IMCO). The IMCO Code for the Construction and Equipment of Ships Carrying Dangerous Liquids in Bulk, IMCO Resolution A.212 (VII), recognizes four categories of bulk liquid cargoes. One category consists of substances whose hazards fall outside of the scope of the Code. A second category consists of substances that are considered dangerous, having hazards analogous to oil but of a different nature. Bulk cargoes of these substances are not required to be carried in tanks separated from the hull of the vessel. The other two categories consist of substances which present more substantial hazards than that of oil, *e.g.*, substances which are water reactive highly toxic to humans, corrosive in the presence of water, which have extremely hazardous flammability characteristics, and which have other properties that make their release a serious safety risk. These substances are required to be transported in tanks separated from the hull because they present greater hazards to the safety of crew, the vessel, and populace in the surrounding area. The Coast Guard considers oil to be similar in hazard to the first two categories of substances described above and has developed construction standards accordingly, including these distribution of ballast requirements.

Several commenters implied that *all* new tank vessels, regardless of tonnage, should be built with defensive space for environmental protection. The Coast Guard is not requiring defensive spaces solely to provide protection against spillage in event of grounding or collision accident. As the final environmental impact statement on this subject, published August 15, 1975, pointed out, in new tank vessels of 70,000 DWT and above, segregated ballast tanks are required to eliminate the routine event of contaminating ballast water by the addition of that water to tanks which previously contained oil cargo. It is this practice, necessary to immerse the hull for the return voyage, that leads to intentional operational discharge of oily ballast water, a principal source of marine pollution. The proper distribution of these segregated ballast spaces to achieve a secondary benefit in case of accident is a logical extension of the regulations. Segregated ballast is not required on new tank vessels of less than 70,000 DWT because it would not be an effective pollution prevention measure on smaller vessels since most of these vessels carry petroleum products rather than crude oil and most wash tanks for cargo purity reasons rather than to provide space for clean ballast.

The historical data with respect to the relative frequencies of occurrences of side damaging accidents as a result of collisions and rammings versus bottom damaging accidents as a result of groundings reveal that the side damaging accidents occur 1.5 times as often as the bottom damaging accidents.

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Data on spill frequency by type of accident are considered more reliable because of better reporting procedures. These data reveal that spills from the side of a vessel from collisions and rammings occur 1.4 times as often as the spills from the bottom from strandings and groundings. As a general rule, within the cargo tank length, the side shell area of a tank vessel including both sides is very nearly equal to the bottom shell area. These two factors would suggest a preference for side protection over bottom protection. The Coast Guard studied a large number of U.S. Salvage Association damage reports to determine if there were any particular areas of the cargo tank block of a tanker that were more prone to damage than other areas. The study revealed that no particular area of the tanker is immune to damage. However, one damage prone area was identified, the area of the turn of the bilge.

Information on the depth of penetration in cases of collision and grounding is extremely scarce. It must be remembered, however,, that the physical phenomenon of a side damaging accident makes likely the loss to the sea of the entire contents of an injured tank. This is due to the fact that the specific gravity of most oils is less than seawater and a pressure differential is created by the breach of the hull which allows entering water to displace the oil within the tank. How fast this occurs depends, of course, on the size of the hole and whether it is at or below the waterline. This phenomenon was documented in a Coast Guard report dated May 1945 entitled, "Suggestions Concerning Tank Vessel Operation During Wartime (Based upon Experiences of 6,000 Tankermen Attacked by Submarine)." The following excerpt from that report concerning torpedo damage is of interest:

> We would find a hole in the ship's side at least large enough to drive a truck through. Let us go through the hole into the tank, we would find an interesting thing happening. Although the tank was full of cargo we would see the ocean pouring into the tank at the bottom of the hole and the crude oil cargo pouring into the ocean at the top of the hole—*i.e.*, we would see two liquids, water and oil, pouring through the same hole at the same time in opposite directions! This is a very interesting discovery for it means that all of the oil in the tank is going to be displaced by seawater very quickly and that in a matter of minutes either the tank will be filled with seawater or what oil remains in the tank will be trapped at the top by the seawater.

This early report was further corroborated by model testing conducted by the Japanese which simulated various size holes in the side of a vessel. This information was submitted to IMCO in 1970 in document DE/25.

In the case of bottom damage, the physics are such that when a puncture of similar size to the previously mentioned side injury is made into the bottom of the cargo tank, a portion of the oil will flow out until a hydrostatic balance is achieved within the tank. This portion will tend to be increased by any dynamic pumping action due to the motion of the ship. This behavior has been demonstrated by model tests conducted at the Netherlands Ship Model Basin. It is also confirmed by the experience of the VLCC Metula where more oil was apparently lost than would have been expected owing to the unusually strong currents to which the vessel was subjected while grounded in the Straits of Magellan in late 1974.

Both of these phenomena regarding side and bottom injuries have been well understood for a number of years. In fact, they underlie the development of cargo tank size and arrangement regulations that deal with the probability of volume of outflows. It is also necessary to understand that the hypothetical damages that are imposed upon a tanker design in arriving at the assumed outflows are severe conditions of damage. They do not necessarily represent the absolute worst case but are well up a relative scale toward the worst case. Furthermore, the hypothetical damages are not imposed randomly but are assumed to occur at the *worst location*. This means that in a large number of collisions and groundings the actual extent of damage will be considerably less than the hypothetical damage, which also means that the actual outflow will likely be less than hypothetical. A smaller degree of damage, however, does not in itself ensure a considerable outflow reduction. As already pointed out, a very small hole in the side of a tank will eventually result in the loss of the total contents of the tank, whereas a similar hole in the bottom will result in considerably less outflow.

Many spills, of course, do not approach the hypothetical limits primarily because the damage is not as severe as the damage assumptions. This would appear to favor a scheme of uniform dis-

tribution of ballast space so as to cover as much of the shell area of the tanker as possible. However, as already noted, historical data show that a small number of accidents where large amounts of oil have been spilled or where the vessel has been totally lost account for the bulk of the total spillage. This would indicate that protection is warranted in order to decrease the severity of the spillage in these cases and to ensure the survivability of the vessel. In some accidents the severity of damage will be such that no amount of protection will be effective, but there are still many accidents where the protection will be effective. The problem of whether the defensive space should be used as lump placement or as relatively thin uniform distribution leads to conflicting solutions. The amount of segregated ballast to be distributed within the cargo block of a tanker is limited, being on the order of 20 percent of the full load displacement. Uniform distribution of this ballast volume into relatively thin spaces separating cargo from shell can reduce hypothetical outflows to some extent, however, lump placement of the ballast as in staggered wing tank designs can effect a greater reduction in the hypothetical outflows associated with more serious accidents.

There is another reason entirely divorced from the spillage problems, that uniform distribution is not entirely feasible. This involves the problem of maintaining the longitudinal stress within established criteria while ensuring that segregated ballast is so distributed as to be able to meet the draft and trim requirements. The amount of segregated ballast to be distributed is not sufficient to accommodate both uniform distribution and necessary location. Therefore, the proposed segregated ballast distribution formula was developed as a compromise requiring some amount of uniform distribution of the ballast but also leaving the designer sufficient flexibility to place some of the ballast within the cargo tank length at the proper locations to ensure that the vessel remains within the strength criteria and meets the draft and trim requirements.

Several commenters suggested that the proposed formula for ballast distribution was biased in favor of side protection versus bottom protection because of accepting smaller minimum separation spaces for sides. Several commenters also criticized the .65 and .45 coefficients which were embodied in the formula as biasing the formula in favor of side protection versus bottom protection. The bias for side protection was attributable to the additional consequences that occur in cases of collisions and rammings. Often collisions and rammings of tankers penetrating the cargo tank area result in fire and explosions of serious proportions, in many cases engulfing the entire vessel with the potential for loss of life of the crew members in addition to oil outflow.

It is not necessary to have a high energy collision for this to occur. The 1975 collision of the *Edgar M. Queeny* with the moored vessel *Corinthos* in the Delaware River is a notable example. The port anchor of the *Queeny* penetrated the *Corinthos* in the cargo tank area and that was the *sole* contact between the two vessels. Yet, by this minor injury, the *Corinthos* was subsequently engulfed by explosions and fire resulting in 26 deaths, pollution, and hazarding of the nearby refinery facility and community. Notwithstanding this explanation, these regulations have been adjusted to remove the bias for side protection, recognizing that prevention of pollution is a directly relatable benefit and the additional benefits implied above are more conjectural.

Several commenters referred to the Office of Technology Assessment report on "Oil Transportation by Tankers: An Analysis of Marine Pollution and Safety Measures" (July 1975) and also an ECO, Inc., report entitled, "Economic and Environmental Aspects of the Construction and Operation of Oil Tankers," (March 1975) done for the Council on Environmental Quality. Both of these reports purported to be complete examinations of the factors involved. From their limited viewpoint of spill mitigation, the reports concluded that double bottoms and double hulls would be the most effective type of construction in respect of prevention of outflows in case of accidents. The Coast Guard must, however,

to briefly examine what the effect of these goals will be on specific design configurations for new tank vessels. The regulations will require two things: first, a 20 percent reduction from maximum in the average of the hypothetical outflows and second, that a certain percentage of the hull must have protective space separating the cargo from the hull. Certain vessel design configurations do not meet the hull coverage criteria and these particular designs are required to achieve a greater outflow reduction in the hypothetical outflow. For these designs, the effect of the rule is that the vessels must be designed with greater internal subdivision of the cargo tanks. One commenter pointed out that he was satisfied that the amount of oil spilled would be inversely proportional to the number of cargo compartments on a tanker. This is true to the point beyond which the extent of damage to be expected becomes too great, i.e., where multiple tank boundaries become involved.

Many commenters expressed a concern with respect to the application of these rules to existing tank vessels. The Coast Guard has a working group as a subsidiary body to the National Committee for the Prevention of Marine Pollution examining all aspects of this problem. It must be emphasized that even should the study determine the desirability of retrofitting segregated ballast on existing vessels, the only apparent practical way of doing this would be to use a staggered wing tank type of design configuration.

In summary, the Coast Guard considers the revised rules as published in this document to be an improvement upon the proposed rules in that the criteria are easier to understand and apply. Yet, the revised rules are not substantially different in their effect from the previously proposed rules. The rules provide sufficient flexibility for the design of safe, efficient segregated ballast tankers. The Coast Guard believes that providing sufficient flexibility is absolutely necessary to encourage variations in design and intends in the long term to review the historical experience resulting from the application of these regulations. The review may result in revision of these rules if certain alternatives are found in practice to be superior to others.

In consideration of the foregoing, the proposed regulations that appear in the October 14, 1975, issue of the FEDERAL REGISTER (40 FR 48289) are hereby adopted subject to changes discussed in preceding paragraphs. It was Congressional intent that the regulations be effective not later than June 30, 1974, and any further delay would be contrary to the public interest. Accordingly, it is found necessary to make the regulations effective on January 8, 1976.

In consideration of the foregoing, Chapter I of Title 33, Code of Federal Regulations, is amended as follows:

1. Section 157.03 is amended by adding paragraph (aa) to read as follows:

§ 157.03 Definitions.

* * * * * *

(aa) "Cargo tank length" means the length from the collision bulkhead to the forward bulkhead of the machinery spaces.

2. Section 157.08 is amended by adding paragraph (a)(4) to read as follows:

§ 157.08 Applicability.

(a) * * *

(4) The requirements in § 157.09(d) do not apply to vessels constructed under a contract awarded before January 8, 1976.

* * * * * *

3. Section 157.09 is amended by revising paragraph (d) and adding paragraphs (e) through (g) to read as follows:

§ 157.09 Segregated ballast.

* * * * * *

(d) Segregated ballast spaces, voids, and other noncargo-carrying spaces for a vessel of conventional form must be distributed—

(1) So that the mathematical average of the hypothetical collision (O_c) and the hypothetical stranding (O_s) outflows as determined by the application of the procedures in § 157.19 and Appendix B is 80 percent or less of the maximum allowable outflow (O_A) as determined by paragraph 157.19(b)(1); and

(2) To protect at least 45 percent of the sum of the side and bottom shell areas, based upon projected molded dimensions, within the cargo tank length.

Certain of the proposed operational requirements for these foreign vessels are different from those required of U.S. vessels. To monitor foreign vessels to determine if they are in compliance, while on the high seas, with all of the operational requirements proposed for U.S. vessels would be a disputable extension of United States legal authority and jurisdiction. Therefore, it is proposed to limit these operational requirements for foreign vessels to operations while on the navigable waters of the United States including the territorial seas.

The present international treaty governing discharges on the high seas is the International Convention for the Prevention of Pollution of the Sea by Oil, 1954 (12 UST 2989, TIAS 4900, 327 UNTS 3), and the 1962 amendments to that Convention (17 UST 1523, TIAS 6109, 600 UNTS 332). Generally, this Convention prohibits the discharge of oily mixtures from tank vessels within 50 miles of a shore. However, the definition of oil is limited to the so-called "black oils" and the concentration of oil in the discharge must exceed 110 ppm to be considered an oily mixture.

The 1969 amendments to the 1954 Convention contain specific discharge criteria very similar to the criteria embodied in the International Convention for the Prevention of Pollution from Ships, 1973 but have not to date received the requisite number of ratifications necessary to enter into force. Many of the nations in whose vessels oil is imported into the United States have ratified the 1969 amendments and placed them into effect for their vessels.

The Coast Guard considers that there are at least three reasons why foreign vessels while navigating the high seas will be complying with the discharge criteria imposed on U.S. vessels, although there are no specific proposed requirements in this action because of the reasons mentioned above. First, the necessary equipment, piping, and arrangements would be required by this proposal to be installed on a foreign vessel for navigating in U.S. waters and, therefore, be available for use while the vessel is on the high seas. Vessel personnel would thus have no reasonable excuse, having this equipment available, not to minimize the amount of intentional discharge into international waters. Second, many flag states are in fact requiring that their vessels comply with the 1969 amendments. Third, the value of oil has escalated to the point where indiscriminate discharge into the sea is no longer the most economic method of disposal of oil residues.

By way of contrast, foreign vessels, as well as U.S. vessels, are not allowed to discharge oily mixtures in nonharmful quantities while in waters subject to U.S. jurisdiction. The definition of clean ballast in 33 CFR Part 157 is that ballast which does not contain a "harmful quantity" as defined in 40 CFR Part 110.

Foreign vessels of a signatory flag state must comply with the international treaty concerning subdivision and stability, the International Convention on Load Lines, 1966 (18 UST 1857, TIAS 6331, 640 UNTS 133).

Tables 1 and 1a, reproduced from the draft environmental impact statement on this proposed regulation, summarize the applicability of the requirements of proposed amended Part 157 with respect to the various categories of tank vessels established by the regulations.

TABLE 1.—*Pollution prevention requirements for tank vessels, Title 33, Part 157, Code of Federal Regulations*

Requirements	Reference	U.S. Tankers—domestic trade [1,2]		U.S. Tankers—Foreign trade [1,3]		Foreign tankers [1,4]	
		New [5]	Existing [6]	New [7]	Existing [8]	New [7]	Existing [8]
Oil record book	151.35	×	×	×	×	[9]	[9]
Design and equipment requirements:							
Segregated ballast	157.09	×	.....	×	.....	×	
Segregated ballast space distribution	157.09(d)	[9]	.....	[10]	.....	[11]	
Pumping, piping, and discharge arrangements	157.11	×	[12]	×	[12]	×	[12]
Designated observation area	157.13	×	.....	×	.....	×	
Cargo slop tanks	157.15	×	×	×	×	×	×
Oily residue tank	157.17	×	×	×	×	×	×
Cargo tank arrangement and size	157.19	×	[14,15]	×	[14,15]	×	[15,15]
Subdivision and stability	157.21	×	.....	×	.....	[17]	
Cargo and ballast system information	157.23	×	×	×	×	×	×
Submission of calculations, plans, and specifications	157.24	×	.....	×	.....	×	
Vessel operating requirements:							
Discharge requirements:							
Discharges: tank vessels, carrying oil exclusively in rivers, lakes, bays, sounds, and the Great Lakes, and seagoing tank vessels of less than 150 gross tons.	157.27	(d)	[15]	[15]	[15]	.....	
Discharges from tank barges exempted for certain design requirements.	157.28		[15]	[15]	[15]	.....	
Discharges: seagoing tank vessels of 150 gross tons or more.	157.29		[15]	×	×	[15]	[15]
Discharges; chemical additives	157.31	×	×	×	×	[15]	[15]
Discharge of cargo residue	157.37	×	×	×	×	.....	
Machinery space bilges	157.39	×	×	×	×	.....	
Emergencies	157.41	×	×	×	×	.....	
Discharges: Clean and segregated ballast	157.43	×	×	×	×	[15]	[15]
Water ballast in oil fuel tanks	157.33	×	.....	×	.....	×	
Ballast added to cargo tanks	157.35	×	.....	×	.....	.....	
Valves in cargo or ballast piping system required to be closed at sea.	157.45	×	×	×	×	.....	
Information for master	157.47	×		×		.....	
Instruction manual	157.49	×	×	×	×	×	×

[1] This table covers 2 groups of regulations: (*a*) Those in effect as of Jan. 8, 1976, applicable to U.S. tank vessels in domestic trade (shown in col. headed "U.S. Tankers—Domestic Trade," published in 40 FEDERAL REGISTER 48280, Oct. 15, 1975, and 41 FEDERAL REGISTER 1479, Jan. 8, 1976, and referred to in this statement as "present regulations"), and (*b*) proposed changes to the regulations in 33 CFR pt. 157 extending rules for tank vessels in domestic trade to cover U.S. tank vessels in foreign trade and foreign tank vessels entering U.S. waters (shown in cols. headed "U.S. Tankers—Foreign Trade" and "Foreign Tankers" and referred to as "proposed regulations").

[2] "Domestic trade" is defined in present regulation 157.03(z) as "trade between ports or places within the United States, its territories and possessions, either directly or via a foreign port including trade on the navigable rivers' lakes, and inland waters."

[3] "Foreign trade" is defined by proposed regulation 157.03(cc) as "a trade that is not domestic trade." See note 2 for definition of domestic trade.

[4] "Foreign vessel" is defined in proposed 157.03(bb) as a vessel that is not documented under the laws of the United States except a public vessel other than those engaged in commercial service.

[5] "New vessel" is defined in present regulation 157.01(i) in terms of contract, keel-laying, and delivery dates. See table 1a for specific dates.

[6] "Existing vessel" is defined in present regulation 157.01(j) as "any vessel that is not a new vessel" and this definition is not changed by the proposed regulations.

[7] The definition of new vessel in proposed regulation 157.03(i) has been expanded to cover U.S. tank vessels in foreign trade and foreign tank vessels entering U.S. waters. Refer to table 1a for dates used in definitions.

[8] Oil record book requirements in present 33 CFR 151.35 are not applicable to foreign vessels. The requirements now in 33 CFR 151.05(*c*) regarding inspection and maintenance of oil record books on foreign vessels do apply.

[9] Segregated ballast space distribution requirements are applicable to new tank vessels contracted for after Jan. 8, 1976.

[10] Segregated ballast space distribution requirements would not be applicable to vessels built before the effective date of final regulations (see proposed regulation 157.08(a)(4)(ii)).

[11] Segregated ballast space distribution requirements would not be applicable to new vessels built before the effective date of final regulations (see proposed regulation 157.08(a)(4)(iii)).

[12] Existing vessels must comply with present regulation 157.11 before Dec. 31, 1977 (see note following 157.11).

[13] An existing vessel that is a foreign vessel or a U.S. vessel that carries oil in foreign trade must comply with the requirements in 157.11 before Dec. 31, 1979 (see proposed revision to note following 157.11).

[14] See note following present 157.19 for applicability of cargo tank arrangement and size requirements to existing vessels.

[15] Some vessels.

[16] See proposed 157.19 and note following for applicability to existing vessels.

[17] The requirements of present regulation 157.21 concerning subdivision and stability and of present regulation 157.47 regarding stability and loading information are not going to be extended to cover foreign vessels. Foreign vessels must comply with presently recognized international law in this area, the International Convention on Load Lines, 1966 (18 UST 1857, TIAS 6331, 640 UNTS 133).

[18] Discharge into the navigable waters of the United States must comply with the requirements of the referenced section.

TABLE Ia.—*Definition of "New Vessel"*

	1973 Marine Pollution Convention	Note 5, U.S. tankers domestic trade	Note 7, U.S. tankers foreign trade	Note 7, foreign tankers
"New vessel" means a vessel that—				
is constructed under a contract awarded after ____:				
in the absence of a building contract, has the keel laid	Dec. 31, 1975	Dec. 31, 1974	Dec. 31, 1975	Dec. 31, 1975
or is at a similar stage of construction after ____:	June 30, 1976	June 30, 1975	June 30, 1976	June 30, 1976
is delivered after ____; or	Dec. 31, 1979	Dec. 31, 1977	Dec. 31, 1979	Dec. 31, 1979
has undergone a major conversion for which—				
the contract is awarded after ____; in the absence of a contract, conversion is begun	Dec. 31, 1975	Dec. 31, 1974	Dec. 31, 1975	Dec. 31, 1975
after ____; or	June 30, 1976	June 30, 1975	June 30, 1976	June 30, 1976
conversion is completed after ____	Dec. 31, 1979	Dec. 31, 1977	Dec. 31, 1979	Dec. 31, 1979

In order to extend the application of Part 157 to foreign vessels entering the navigable waters of the United States and U.S. vessels in foreign trade, the definition of "new vessel" in § 157.03(i) would be amended to include a foreign vessel or U.S. vessel that carries oil in foreign trade and meets one of the following: is constructed under a contract awarded after December 31, 1975; in the absence of a building contract, has the keel laid or is at a similar stage of construction after June 30, 1976; is delivered after December 31, 1979; has undergone a major conversion for which the contract is awarded after December 31, 1975; in the absence of a contract, conversion is begun after June 30, 1976, or conversion is completed after December 31, 1979. Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, specifies the above dates for application of certain important construction standards rather than basing effective dates upon a stated period after entry into force as is usually done. Therefore, prudent owners are already including these standards in new vessels, even absent these proposed regulations, in order to avoid having to retrofit, reconstruct, or retire early relatively young vessels when the Convention does enter into force.

The definition for "existing vessels" (any vessel that is not a new vessel) would not be changed. However, the requirements in §§ 157.11, 157.15, and 157.17 would become effective for existing vessels as follows: an existing vessel that is a U.S. vessel that carries oil in domestic trade must comply with those requirements before December 31, 1977; an existing vessel that is a foreign vessel or a U.S. vessel that carries oil in foreign trade must comply with those requirements before December 31, 1979. These effective dates are not dates certain from the 1973 Convention. The Coast Guard considers that these proposed effective dates allow a reasonable time period for existing U.S. and foreign vessels to meet the proposed requirements.

Section 157.08 has been revised to require foreign tank vessels entering the navigable waters of the United States and U.S. tank vessels in foreign trade to comply with § 157.09(d) if the vessel is contracted for after the effective date of these regulations. The requirements of § 157.09(d) concerning distribution of required segregated ballast spaces exceed the requirements of the International Convention for the Prevention of Pollution from Ships, 1973, because the Coast Guard perceives a secondary beneficial use for these spaces as protective spaces in case of accidents. All other requirements in amended Part 157 would be consistent with the provisions of the Convention except that the regulations, as amended, would implement the Convention at an earlier date than it appears the Convention will enter into force.

A draft environmental impact statement that discusses these proposed regulations has been filed with the Council on Environmental Quality.

It is hereby certified that this regulatory action is not a major proposal in accordance with Executive Order 11821, dated November 27, 1974, and Departmental implementing instructions.

In consideration of the foregoing, it is proposed to amend Chapter I of Title 33 Code of Federal Regulations, as follows:

PART 157—RULES FOR THE PROTECTION OF THE MARINE ENVIRONMENT RELATING TO TANK VESSELS CARRYING OIL IN BULK

1. The title of Part 157 is revised to read as follows:

"Rules for the Protection of the Marine Environment Relating to Tank Vessels Carrying Oil in Bulk."

2. Section 157.01 is revised and a note is added to follow § 157.01 to read as follows:

§ 157.01 Applicability.

(a) This part prescribes design, equipment, and operation requirements for tank vessels of 150 gross tons or more carrying oil in bulk that—

(1) are documented under the laws of the United States (U.S. vessels); or

(2) are not U.S. vessels and enter the navigable waters of the United States (foreign vessels).

(b) This part does not apply to public vessels not engaged in commercial service.

NOTE: Additional requirements for U.S. vessels are found in 46 CFR Subchapters O and D.

3. Section 157.03 is amended by revising paragraphs (i) and (w) to read as follows:

§ 157.03 Definitions.

• • • • •

(i) "New vessel" means—

(1) a U.S. vessel in domestic trade that—(i) is constructed under a contract awarded after December 31, 1974;

(ii) in the absence of a building contract, has the keel laid or is at a similar stage of construction after June 30, 1975;

(iii) is delivered after December 31, 1977; or

(iv) has undergone a major conversion for which—(A) the contract is awarded after December 31, 1974;

(B) in the absence of a contract, conversion is begiun after June 30, 1975; or

(C) conversion is completed after December 31, 1977; and

(2) a foreign vessel or a U.S. vessel in foreign trade that—(i) is constructed under a contract awarded after December 31, 1975;

(ii) in the absence of a building contract, has the keel laid or is at a similar stage of construction after June 30, 1976;

(iii) is delivered after December 31, 1979; or

(iv) has undergone a major conversion for which—(A) the contract is awarded after December 31, 1975;

(B) in the absence of a contract, conversion is begun after June 30, 1976; or

(C) conversion is completed after December 31, 1979.

• • • • •

(w) "Foreign trade" means any trade that is not domestic trade.

• • • • •

4. Section 157.08 is revised to read as follows:

§ 157.08 Applicability of subpart B.

This subpart applies to vessels under this part that are seagoing except as follows:

(a) Section 157.21 also applies to vessels under this part on voyages on the Great Lakes.

(b) Sections 157.11, 157.13, and 157.15 do not apply to a tank vessel that carries only asphalt.

(c) Sections 157.11, 157.13, 157.15, and 157.23 do not apply to a tank barge that can not ballast cargo tanks or wash cargo tanks while proceeding en route.

(d) Sections 157.19 and 157.21 do not apply to a tank barge whose certificate is endorsed by the Coast Guard for a limited short protected coastwise route if the barge is constructed and certificated primarily for service on an inland route.

(e) Section 157.09(d) does not apply to any—

(1) U.S. vessel in domestic trade that is constructed under a contract awarded before January 8, 1976;

(2) U.S. vessel in foreign trade that is constructed under a contract awarded before (effective date of regulations to be inserted); or

(3) foreign vessel that is constructed under a contract awarded before (effective date of regulations to be inserted).

§ 157.11 [Amended]

5. The note following § 157.11 is revised to read as follows:

Effective date of § 157.11. An existing vessel that is a U.S. vessel in domestic trade must comply with § 157.11 before December 31, 1977. An existing vessel that is a foreign vessel or a U.S. vessel in foreign trade must comply with § 157.11 before December 31, 1979.

§ 157.15 [Amended]

6. The note following § 157.15 is revised to read as follows:

Effective date of § 157.15. An existing vessel that is a U.S. vessel in domestic trade must comply with § 157.15 before December 31, 1977. An existing vessel that is a foreign vessel of a U.S. vessel in foreign trade must comply with § 157.15 before December 31, 1979.

§ 157.17 [Amended]

7. The note following § 157.17 is revised to read as follows:

Effective date of § 157.17. An existing vessel that is a U.S. vessel in domestic trade must comply with § 157.17 (a) and (b) before December 31, 1977. An existing vessel that is a foreign vessel or a U.S. vessel in foreign trade must comply with § 157.17 (a) and (b) after December 31, 1979.

8. Section 157.19(a) and the note following § 157.19 are revised to read as follows:

§ 157.19 Cargo tank arrangement and size.

(a) This section applies to—(1) A U.S. or foreign vessel that is delivered after January 1, 1977;

(2) A U.S. vessel that is delivered before January 1, 1977, for which the building contract is awarded after January 1, 1972, or, if there is no building contract, the keel is laid or the vessel is at a similar stage of construction after June 30, 1972; and

(3) A foreign vessel that is delivered before January 1, 1977, for which the building contract is awarded after January 1, 1974, or if there is no building contract, the keel is laid or the vessel is at a similar stage of construction after June 30, 1974.

* * * * *

Effective date of § 157.19. Vessels to which § 157.19(a)(2) applies must meet § 157.19 before December 31, 1976; however, if a vessel is constructed under a contract awarded before January 1, 1974 and does not carry crude oil, fuel oil, heavy diesel oil, or lubricating oil, the requirements in § 157.19 do not apply. Vessels to which § 157.19(a)(3) apply must meet § 157.19 before June 30, 1978.

* * * * *

9. The introductory text of § 157.21 is revised to read as follows:

§ 157.21 Subdivision and stability.

A new vessel that is a U.S. vessel must meet the following subdivision and damage stability criteria after assuming side and bottom damages as defined in Appendix B of this Part. A U.S. vessel that meets the requirements in this section is considered by the Coast Guard as meeting 46 CFR 42.20-5.

* * * * *

10. Section 157.24 (a), (b), and (d) are revised to read as follows:

§ 157.24 Submission of calculations, plans and specifications.

* * * * *

(a) Calculations to substantiate compliance with the tank arrangement and size requirements under § 157.19, or a letter from the government of the vessel's flag state that certifies compliance with—(1) Section 157.19; or

(2) Regulations 24 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973.

(b) Except for a new vessel that is a foreign vessel, calculations to substantiate compliance with subdivisions and damage stability requirements under § 157.21.

* * * * *

(d) Plans and specifications for the vessel that include—

(1) design characteristics;

(2) a lines plan;

(3) curves of form (hydrostatic curves);

(4) a general arrangement plan of each deck and level;

(5) inboard and outboard profile plans showing oiltight and watertight bulkheads;

(6) a midship section plan;

(7) a capacity plan showing the capacity and the vertical and longitudinal centers of gravity of each cargo space, tank, and similar space;

(8) tank sounding tables;

(9) draft mark locations;

(10) detailed plans of watertight doors; and

(11) detailed plans of vents.

11. Section 157.25 is revised to read as follows:

§ 157.25 Exceptions to applicability.

(a) Sections 157.29, 157.31, and 157.43 apply to foreign vessels when they discharge into the navigable waters of the United States.

(b) Sections 157.35, 157.37, 157.39, 157.45, and 157.47 do not apply to foreign vessels.

12. Section 157.43 is revised to read as follows:

§ 157.43 Discharges: clean and segregated ballast.

(a) Clean ballast may be discharged in accordance with § 157.37(a)(6).

(b) The master of a vessel under this part shall ensure that segregated ballast is not discharged unless he finds no oily mixture in the ballast after—(1) visually examining the top of the ballast contents of each tank; or

(2) testing the ballast contents of each tank with an oil/water interface detector.

13. The introductory text of § 157.47 is revised to read as follows:

§ 157.47 Information for master.

A master or person in charge of a new vessel shall operate the vessel in accordance with the information required in 46 CFR 31.10-30(d) that includes the following:

* * * * *

(R.S. 4417a (3) and (7), as amended (46 U.S.C. 391a (3) and (7)); 49 CFR 1.46(n)(4).)

Dated: April 6, 1976.

W. M. BENKERT,
Rear Admiral, U.S. Coast Guard, Chief, Office of Merchant Marine Safety.

[FR Doc.76-10454 Filed 4-14-76;8:45 am]

DEPARTMENT OF TRANSPORTATION

COAST GUARD

FINAL

ENVIRONMENTAL IMPACT STATEMENT

REGULATIONS FOR U.S. TANK VESSELS CARRYING OIL IN FOREIGN TRADE AND FOREIGN TANK VESSELS THAT ENTER THE NAVIGABLE WATERS OF THE UNITED STATES

PROTECTION OF THE MARINE ENVIRONMENT

OCTOBER 1976

SUMMARY

( ) Draft (X) Final

Department of Transportation
U. S. Coast Guard

Contact Individual:

Executive Secretary
Marine Safety Council
U. S. Coast Guard (G-CMC/81)
Washington, D. C. 20590
(202) 426-1477

1. Name of Action.

(X) Administrative Action ( ) Legislative Action

2. Description of Action.

The pollution prevention regulations in Title 33, Part 157, Code of Federal Regulations, are to be amended by extending the present requirements to cover two additional groups of vessels: U. S. tank vessels carrying oil in foreign trade and foreign tank vessels carrying oil to or from U. S. ports. The purpose of these regulations is to control the discharge of oily mixtures from tank cleaning and deballasting operations and to incorporate construction requirements for new vessels which will reduce spill size in future casualties and improve the survivability of tankers after damage. These regulations are based on requirements contained in the International Convention for the Prevention of Pollution from Ships, 1973, but also include constraints not included in the Convention on the location of segregated ballast spaces required on new tank vessels over 70,000 deadweight tons.

3. Environmental Impact and Adverse Environment Effects

Application of the discharge criteria to these two additional groups of vessels will reduce operational outflows by approximately 5,760 metric tons per year. Additional reductions will be achieved in future years as new vessels built with improved damage resistance and defensive space arrangement enter service. Additional reductions will also result from adoption of similar control measures by other countries with the adoption and entry into force of the International Convention for the Prevention of Pollution from Ships, 1973. The Coast Guard believes the extension of U. S. regulations to foreign vessels carrying oil to or from U. S. ports will contribute toward adoption of the Convention by other countries.

It is impossible to say what impact the elimination of the oil pollution that would otherwise occur will have on the marine environment. Too little is known about the ocean system and its ability to accommodate petroleum hydrocarbon inputs. Until basic questions concerning the level of petroleum hydrocarbon input at which irreversible damage will occur can be answered it seems wisest to work for international control of inputs and push forward research to reduce our current level of uncertainty. These regulations are consistent with that goal.

These regulations should have no adverse environmental effects.

4. Economic Impact

These regulations require a number of actions to be taken by shipowners in an effort to reduce oil inputs to the oceans. These actions will require additional capital investment in vessels and equipment and will also increase operating costs. It is likely that these additional costs of doing business will be passed on to the consumer as increased transportation costs added onto the price of petroleum products. Under the most pessimistic set of assumptions, these increased transportation costs are estimated to be less than 0.2 cents per gallon. The Coast Guard has considered these costs, along with the need for regulations and the extent to which the rules being considered will contribute to safety and protection of the marine environment, and has concluded that the expenditures involved are warranted by the results expected.

5. Alternatives Considered

In preparing these rules and the earlier rules for U. S. tankers in domestic trade of which these are an extension, the following alternatives were considered:

a. Publish no additional regulations. (No Action)

b. Publish regulations less stringent than those proposed.

c. Publish regulations more stringent than those proposed, including regulations requiring double bottoms, additional segregated ballast and equipment or design features intended to improve maneuvering and stopping ability.

d. Reduction of oil consumption or reduction of oil imports.

e. Use of different mode of transportation for oil.

6. Comments on the draft statement were requested from the agencies and groups listed below. An asterisk (*) indicates comments were received and are attached:

*Department of the Interior
*Environmental Protection Agency
*Department of Defense
*Department of Commerce
*Department of Transportation
*Department of State
Sierra Club
Connecticut Citizens Action Group
*Center for Law and Social Policy (representing a number of environmental groups)
American Petroleum Institute
American Institute of Merchant Shipping
American Association of Port Authorities
American Maritime Association
American Waterways Operators, Inc.
Shipbuilders Council of America
Environmental Policy Center
Coalition Against Oil Pollution
National Audubon Society

7. Dates statements were made available to the Council on Environmental Quality and the public:

Draft statement	16 April 1976
Final statement	12 NOV 1976

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The Coast Guard now proposes to make these earlier rules, which were applicable only to U. S. vessels in domestic trade, applicable to two additional groups of vessels:

- U. S. tank vessels carrying oil in foreign trade, and
- Foreign tank vessels carrying oil and entering the navigable waters of the United States.[2]

Just as the regulations now proposed are an extension of the earlier regulations, this environmental impact statement extends or supplements information contained in the earlier impact statement. The proposed regulatory action is based on information assembled and decisions made in the course of developing the rules for tankers in domestic trade. The reader should have available the earlier statement and consider information referred to in it in conjunction with this statement.

---

[2] Where the phrases "navigable waters of the United States" and "navigable waters" appear in this statement, their meanings are as given in 33 CFR 2.05-25(a) as amended by 40 Federal Register 49327, 22 October 1975. They include territorial seas (a belt three miles wide adjacent to the U. S. coast), internal waters, and inland waters.

Table 1

Pollution prevention requirements for tank vessels, Title 33, Part 157, Code of Federal Regulations

Requirements	Reference	U. S. Tankers--Domestic Trade[1,2]		U. S. Tankers--Foreign Trade[1,3]		Foreign Tankers[1,4]	
		new[5]	existing[6]	New[7]	existing[6]	new[7]	existing[6]
Oil record book	151.35	X	X	X	X	(8)	(8)
Design and equipment requirements							
Segregated ballast	157.09	X		X		X	
Segregated ballast space distribution	157.09(d)	(9)		(10)		(11)	
Pumping, piping and discharge arrangements	157.11	X	(12)	X	(13)	X	(13)
Designated observation area	157.13	X		X		X	
Cargo slop tanks	157.15	X	X	X	X	X	X
Oily residue tank	157.17	X	X	X	X	X	X
Cargo tank arrangement and size	157.19	X	(14 15)	X	(16 15)	X	(16 15)
Subdivision and stability	157.21	X		X		(17)	
Cargo and ballast system information	157.23	X	X	X	X	X	X
Submission of calculations, plans, and specifications	157.24	X		X		X	

Table 1 (continued)

Pollution prevention requirements for tank vessels, Title 33, Part 157, Code of Federal Regulations

Requirements	Reference	U. S. Tankers--Domestic Trade[1,2]		U. S. Tankers--Foreign Trade[1,3]		Foreign Tankers[1,4]	
		new[5]	existing[6]	new[7]	existing[6]	new[7]	existing[6]
Vessel operating requirements							
Discharge requirements							
Discharges: tank vessels carrying oil exclusively in rivers, lakes, bays, sounds, and the Great Lakes, and seagoing tank vessels of less than 150 gross tons	157.27	(15)	(15)	(15)	(15)		
Discharges from tank barges exempted for certain design requirements	157.28	(15)	(15)	(15)	(15)		
Discharges: seagoing tank vessels of 150 gross tons or more	157.29	(15)	(15)	X	X	(18)	(18)
Discharges; chemical additives	157.31	X	X	X	X	(18)	(18)
Discharge of cargo residue	157.37	X	X	X	X		
Machinery space bilges	157.39	X	X	X	X		
Emergencies	157.41	X	X	X	X		
Discharges: Clean and segregated ballast	157.43	X	X	X	X	(18)	(18)
Water ballast in oil fuel tanks	157.33	X		X		X	
Ballast added to cargo tanks	157.35	X		X			
Valves in cargo or ballast piping systems required to be closed at sea	157.45	X	X	X	X		
Information for master	157.47	X		X			
Instruction manual	157.49	X	X	X	X	X	X

Table 1 (continued)
Pollution prevention requirements for tank vessels
Title 33, Part 157, Code of Federal Regulations

Notes

1. This table covers two groups of regulations: (a) Those in effect as of January 8, 1976, applicable to U. S. tank vessels in domestic trade (shown in column headed "U. S. Tankers--Domestic Trade," published in 40 Federal Register 48280, October 15, 1975, and 41 Federal Register 1479, January 8, 1976, and referred to in this statement as "present regulations"), and (b) proposed changes to the regulations in 33 CFR Part 157 extending rules for tank vessels in domestic trade to cover U. S. tank vessels in foreign trade and foreign tank vessels entering U. S. waters (shown in columns headed "U. S. Tankers--Foreign Trade" and "Foreign Tankers" and referred to as "proposed regulations").

2. Domestic trade is defined in present regulation 157.03(z) as "trade between ports or places within the United States, its territories and possessions, either directly or via a foreign port including trade on the navigable rivers, lakes, and inland waters."

3. Foreign trade is defined by proposed regulation 157.03(cc) as "a trade that is not domestic trade." See note 2 for definition of domestic trade.

4. Foreign vessel is defined in proposed 157.03(bb) as a vessel that is not documented under the laws of the United States except a public vessel other than those engaged in commercial service.
See 157.01(a)(2)

5. New vessel is defined in present regulation 157.01(i) in terms of contract, keel-laying, and delivery dates. See Table 1a for specific dates.

6. Existing vessel is defined in present regulation 157.01(j) as "any vessel that is not a new vessel" and this definition is not changed by the proposed regulations.

7. The definition of new vessel in proposed regulation 157.03(i) has been expanded to cover U. S. tank vessels in foreign trade and foreign tank vessels entering U. S. waters. Refer to Table 1a for dates used in definitions.

8. Oil record book requirements in present 33 CFR 151.35 are not applicable to foreign vessels. The requirements now in 33 CFR 151.05(c) regarding inspection and maintenance of oil record books on foreign vessels do apply.

9. Segregated ballast space distribution requirements are applicable to new tank vessels contracted for after January 8, 1976.

10. Segregated ballast space distribution requirements would not be applicable to vessels built before the effective date of final regulations. (See proposed regulation 157.08(a)(4)(ii).)

Table 2
Discharge standards applicable to tank vessels
Limitations on oil content of mixtures discharged to the sea

Vessel	Space where oily mixture originates	Waters (distance from the nearest land)[1]		
		less than 12 miles	12 to 50 miles	over 50 miles
U. S. Tank Vessel	Machinery Space Bilge	no discharge of oily mixtures permitted[2,3]	.as permitted by 1954 Convention[4] .as permitted by 1973 rev to 33 USC 1002[5] .as permitted by 33 CFR 157.39[6]	.no limit, or .as permitted by 33CFR 157.39[6]
	Cargo tank or cargo pumproom bilge	no discharge of oily mixtures permitted[2,7,8,9]	now, no discharge permitted (1954 Conv, as amended.) no discharge permitted 33 CFR 157.37(a)	.no limit (since U. S. has not adopted 1969 Amendments, or .as permitted by 33 CFR 157.37(a)
Foreign Tank Vessel	Machinery space bilge	no discharge of oily m mixture permitted[2,3]	.as permitted by 1954 Convention[4] .as permitted by 1973 rev to 33 USC 1002[5]	.not limited at present (except for nations enforcing 1969 Amendments) .as permitted by 73 MP Conv, Annex I, Reg 9 (when it comes into force)
	Cargo tank or cargo pumproom bilge	no discharge of oily mixture permitted[2,9]	no discharge of oily mixture permitted (1954 Conv, as amended)	.as limited by 1954 Conv (really no limit) .as limited by 1969,1971 Amendments (effective for some) .as limited by 1973 Conv (when Convention comes into force)

Note: Items in ( ) are those affected by this proposed rulemaking.

Table 2 (continued)
Discharge standards applicable to tank vessels
Limitations on oil content of mixtures discharged to the sea

Notes

1. "From the nearest land" means from the baseline from which the territorial sea of the U. S. is established in accordance with international law. The term "territorial seas" means waters within a belt three miles wide adjacent to the U. S. coast and seaward of the territorial baseline. "Contiguous zone" means the belt of high seas, nine nautical miles wide, adjacent to and seaward of the territorial seas. The term "navigable waters" includes the territorial sea as well as internal waters and inland waters. (See 33 CFR 2.05-25(a) for complete definition of navigable waters.) Refer to 33 CFR 2.05 and 33 CFR 157.03(1).

   There is a problem with mixing terminology and concepts from the 1954 Convention and the 1973 Convention. The 1954 Convention and subsequent amendments use the concept of "prohibited zones" (generally 50 miles from land, except 100 for Canada, the Med., Baltic, etc, plus the Great Barrier Reef.). The 1973 Convention provides for "special areas" (the Med., Baltic, etc) and "no discharge within 50 miles of nearest land" in the discharge criteria. So this table does not precisely reflect standards now in effect with regard to prohibited zones other than 50 miles from shore.

2. Discharge of a "harmful quantity" of oil into U. S. navigable waters and the contiguous zone is prohibited, except for discharges into the contiguous zone permitted under Article IV of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended. (See 40 CFR 110.) The exceptions allowed by Article IV of the 1954 Convention are (a) discharges for securing safety of a ship, preventing damage to a ship or cargo, or saving life at sea, (b) escape of oil due to damage to a ship, and (c) discharge of residue from lube oil or fuel oil purifiers.

3. Present regulations, 33 CFR 157.39, prohibit the discharge of oily mixtures from machinery space bilges within 12 nautical miles of land , except for the purpose of securing the safety of the vessel, saving life at sea, or as a result of damage to the vessel. (See 157.41.)

4. A vessel may discharge oily mixtures containing no oil other than lubricating oil which has drained or leaked from machinery spaces. (33 USCA 1004, Oil Pollution Act, 1961, and Article V of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954.)

5. There are provisions in 33 USCA 1002 and 1016 as amended by PL 93-119 in 1973 which indicate a tanker may discharge an oily mixture from machinery space bilges if (a) the ship is proceeding enroute, and (b) the instantaneous rate of discharge of oil does not exceed 60 liters per mile, and (c) the oil content of the discharge is less than 100 parts per million of the mixture, and (d) the discharge is made as far as practicable from the nearest land. These 1973 amendments to U. S. law do not become effective until the 1969 and 1971 Amendments to the 1954 Marine Pollution Convention are ratified or accepted with the advice and consent of the U. S. Senate. This has not yet taken place and these provisions are therefore not yet in effect.

6. A tank vessel may discharge oily mixtures from machinery space bilges if the vessel is more than 12 miles from the nearest land, proceeding enroute, has in operation an oil discharge monitoring and control system, and is discharging an effluent with an oil content of less than 100 parts per million. (33 CFR 157.39--Now applicable to U. S. tankers in domestic trade, to be extended to U. S. tankers in foreign trade.)

7. Tank vessels operating on inland waters and seagoing tank vessels under 150 gross tons must either retain on board oily mixtures or transfer them to a reception facility. (33 CFR 157.27--Now required by present regulations for U. S. tank vessels in domestic trade, to be extended to U. S. tankers in foreign trade by proposed regulations.)

8. Seagoing tank vessels of 150 gross tons or more may discharge oily mixtures from cargo tanks and cargo pumproom bilges into the sea if the vessel is more than 50 nautical miles from the nearest land and proceeding enroute, the instantaneous rate of discharge of oil does not exceed 60 liters per mile, and the total quantity of oil discharged does not exceed, for an existing vessel, 1/15,000 of the cargo carried, and for a new vessel, 1/30,000 of the total quantity of the cargo from which the discharge came. The vessel must have in operation an oil discharge monitoring and control system. (33 CFR 157.37--Now applicable to U. S. tank vessels in domestic trade, to be extended to U. S. tank vessels in foreign trade.)

2.3 Compliance Assurance Procedures

Design and equipment requirements

Compliance by U. S. tank vessels with design and equipment requirements in these regulations will be verified before the Coast Guard issues or renews Certificates of Inspection.

Compliance by foreign tankers entering U. S. navigable waters will be verified in one of two ways:

1. The Coast Guard will accept certification by a flag state that a particular vessel registered with that state complies with the design and equipment requirements. (See proposed regulation 157.24.)

2. The Coast Guard will certify that a particular vessel complies with the design and equipment requirements on the basis of its own review of vessel plans and inspection of the vessel. The Coast Guard will issue the vessel a letter indicating the relevant requirements have been complied with. (See proposed regulation 157.24.)

Vessel operating requirements

Compliance of both U. S. and foreign tank vessels with vessel operating requirements will be verified as part of the Coast Guard's Marine Environmental Protection Program. This program includes:

3. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE MARINE ENVIRONMENT

3.1 Introduction

Information on the need for regulations aimed at reducing oil pollution from tank vessels and information on oil inputs to the marine environment from tankers is presented on pages 23 - 41 of reference (1).

3.2 Effect of the Regulations on Tanker Oil Pollution

The process of assessing the effects of these regulations on tanker oil pollution is the same as that outlined in reference (1), page 41-52. As noted there, it is impossible with current knowledge and methods to directly assess the impact of varying amounts and distributions of oil inputs on the marine environment. The Coast Guard has, therefore, estimated the effect of these new regulations on oil inputs to the oceans from the vessels they are applicable to. Implicit in this procedure is the assumption that environmental damage is proportional to the amount of annual oil input and independent of space and time distributions.

Estimated effects

The design and construction requirements of these proposed rules apply to two groups of vessels: (1) U. S. tank vessels in foreign trade, both new and existing, and (2) foreign tank vessels that enter the navigable waters of the United States. The operating requirements will apply to foreign tank vessels only while they are in U. S. navigable waters.

As a result of these proposed regulations the Coast Guard expects:

It is assumed that foreign tankers will continue to observe restrictions on discharge of oily mixtures contained in present U. S. and international law and U. S. regulations. (These discharge limitations are summarized in Table 2.) In addition, the Coast Guard believes many foreign tank vessels will comply with the more stringent discharge criteria contained in the 1973 Marine Pollution Convention (which are the same as requirements applicable to U. S. ships). The 1969 Amendments to the 1954 Marine Pollution Convention contain discharge criteria very similar to criteria of the 1973 Marine Pollution Convention. Although the 1969 Amendments have not yet received the required number of ratifications to enter into force, many major shipping nations in whose vessels oil is imported into the United States have ratified the 1969 Amendments and placed them into effect for their vessels. These vessels are, in effect, required by their governments to comply with the discharge criteria in the 1973 Marine Pollution Convention.

The Coast Guard believes there are actually at least three factors working to encourage foreign vessels to comply with the discharge criteria applied to U. S. vessels, even while those foreign vessels are outside U. S. waters:

(1) This proposal will require necessary equipment, piping, and vessel arrangements be provided on such foreign vessels entering U. S. waters. Given the presence of the equipment, vessel personnel will have no reasonable excuse not to minimize intentional discharge into international waters.

(2) As discussed above, many flag states now require their vessels to comply with the 1969 Amendments.

(3) The value of oil has increased to the point where indiscriminate dumping to the sea is no longer the most economic method of disposal of oily residue.

In addition to the three primary expected results of these regulations already cited (U. S. tankers in foreign trade use LOT, new U. S. tankers in foreign trade incorporate segregated ballast spaces, and new foreign tankers in service to U. S. incorporate segregated ballast) which have the largest impact on oil outflows, bilge discharge standards, requirements for cargo tank arrangement and size, and subdivision and stability standards will also reduce outflows.

The greatest immediate reduction in oil inputs to the oceans will result from use of LOT techniques. (Oil inputs from tank cleaning and ballasting operations account for an estimated 80% of the oil entering the oceans from tankers.)

Table 3 compares oil inputs from the vessels to which these rules will apply before and after the rules take effect. As Table 3 indicates, application of the discharge standards reduce operational outflows from tank cleaning and ballasting by nearly 90%.

The effects of the introduction of new segregated ballast tankers into service and the other measures included in the regulations will be smaller than the effect of discharge requirements. Qualitative effects of these other requirements are discussed on pages 42-52 of reference (1).

3.3 Other Impacts of the Regulations

The economic impact, technical feasibility, and safety impact of the regulations are discussed in this section.

Economic Impact

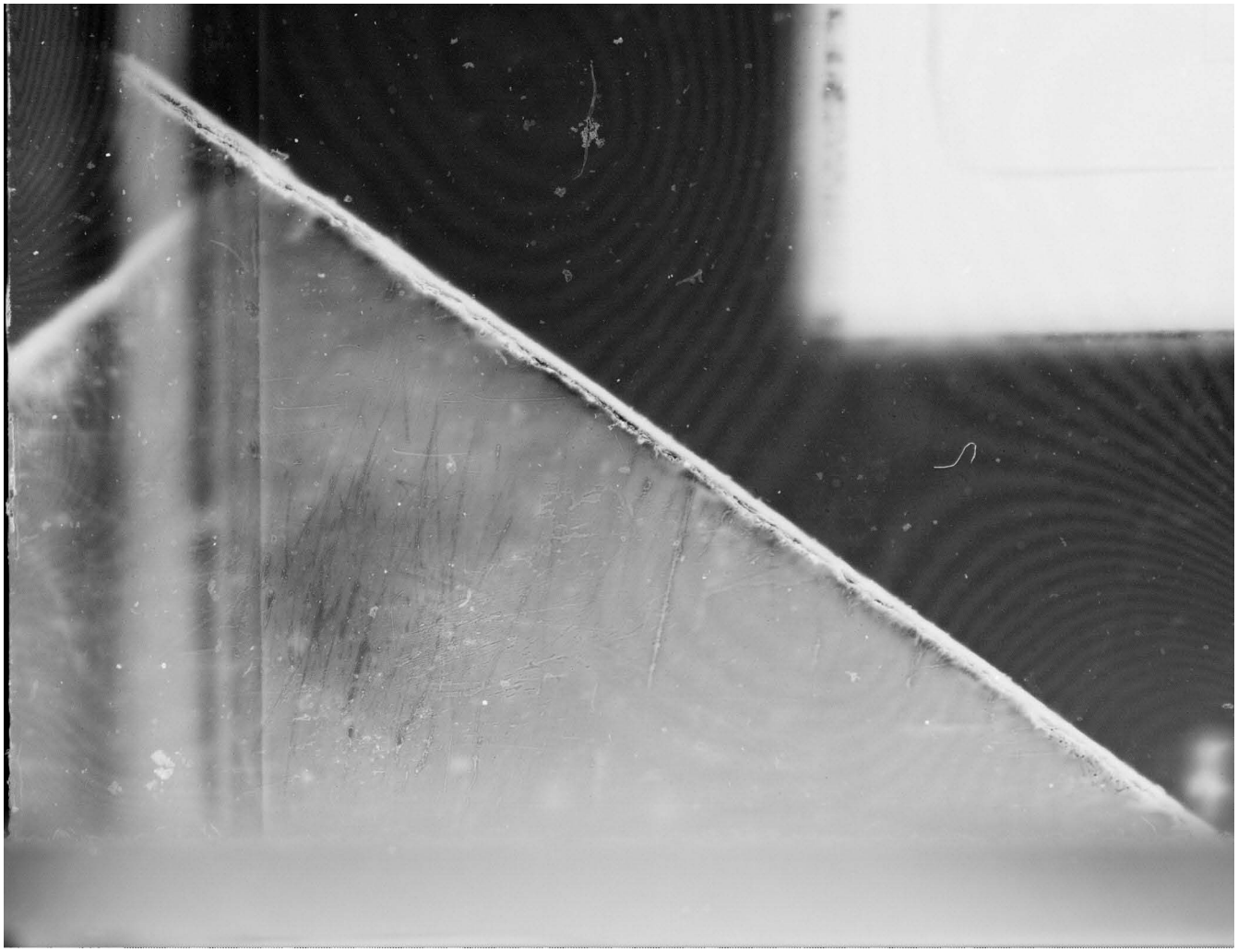
The regulations require a number of actions be taken by shipowners and operators in an effort to reduce oil inputs to the oceans. These actions will require additional capital investment in vessels and equipment and increase operating costs. These increased costs will ultimately be passed on to the consumer as increased transportation costs and higher prices for petroleum products. The actions required by the regulations are shown in Table 4.

TABLE 3 Comparison of oil inputs from tank cleaning and ballasting for U. S. tankships if foreign trade and foreign tankships carrying oil to or from U. S. ports

SOURCE	Estimated Oil Inputs (thousands of metric tons per year)			
	Present		Permitted by Discharge Standards	
	U. S. tankships in foreign trade	Foreign tankships trading to U. S.	U. S. tankships in foreign trade	Foreign tankships trading to U. S.
Ballasting & tank washing for clean ballast, crude & residual carriers	3	76.0	0.07	12.4
Tank cleaning for sediment control, crude & residual	1.8	34.4		
Tank cleaning, refined product carriers for clean ballast and cargo purity	0.5	12.4	0.07	1.53
Tank cleaning prior to shipyard repairs	1.8	25.7	1.2	0.09
TOTALS	7.1	148.5	1.34	14.02

Outflow reduction (U. S. vessels) = 7.1 - 1.34 = 5,760 metric tons/year

Outflow reduction (both U. S. and foreign vessels) = (7.1 + 148.5) - (1.34 + 14.02) = 140,200 metric tons/year



The largest cost associated with these regulations is the increase in construction cost to provide segregated ballast space on new tankers over 70,000 DWT. Various estimates of cost increases to provide segregated ballast have been made. A study submitted by the United States to IMCO prior to the 1973 Pollution Conference estimated the increase in required freight rate to range from about 4% to as much as 10%, depending on ship size, voyage length, how the ballast was distributed (staggered wing, double bottom, double skin, etc.), and a host of other variables.[3] It should be noted that these costs are representative, but not necessarily optimum (no effort was made to optimize individual designs since the study was done to compare various segregated ballast designs) and depend on a great many assumptions involving some uncertainty.

Required freight rate depends on vessel size and length of voyage. Some typical rates, their contribution to oil prices and the effect of a 10% increase in required freight rate are shown in Table 5.

---

[3]Required freight rate (RFR) is commonly used as a measure of vessel profitability. It is defined as the income, per unit of cargo, that a shipowner must collect in order to earn returns equivalent to the repayment of his investment plus some arbitrary (but reasonable) rate of interest. RFR takes into account amortization of capital costs as well as operating costs.

TABLE 4

Action Required by Regulations

Requirement	Existing Vessels	New Vessels
Segregated ballast tanks	Not required	For vessels over 70,000 DWT, increasing size of ship by approximately 20% for same payload results in construction and operating cost increases. Additional pump and piping for segregated ballast system Additional design cost to locate segregated ballast
Cargo residue discharge standards		
Pumping, piping and discharge arrangements	Install new discharge line	Install new discharge line
Designated area	Not required	Locate area so overboard discharge can be observed Install pump shutoff control
Slop tanks	Designate slop tank, modify piping by December 31, 1977	Design and install slop tank system

TABLE 5

TYPICAL TRANSPORTATION COSTS
for
TANKER OIL SHIPMENTS

Voyage	Venezuela - U.S. East Coast	Persian Gulf - U.S. East Coast
Ship	20,000 DWT	150,000 DWT
Approximate Required Freight Rate (RFR)	$0.32/bbl	$0.70/bbl
Assumed Cost of Crude Oil	$ 12/bbl	$ 12/bbl
% of Cost represented by Ocean Transportation	2.7%	5.8%
Maximum Estimated % Increase in RFR[4]	10%	10%
$ Increase in RFR	$0.03/bbl	$ 0.07/bbl
(Price Increase required to cover increased transportation cost)	(0.07 cents/gal)	(0.17 cents/gal)

[4] See page 22 for discussion of range of estimates for increased RFR and factors influencing RFR.

Safety Impact

The regulations, directed at pollution control, will also have safety benefits. Segregated ballast on ships over 70,000 DWT will give additional protection from damage from collisions and groundings (and fires which sometimes occur as a result). Subdivision and stability requirements will contribute to survivability of new tankers after damage also.

The piping system requirements and segregated ballast distribution requirements will increase complexity of tankers and may make proper inspection and repair of tank interiors more difficult. The Coast Guard does not feel these potential problems are serious enough to warrant rejecting these requirements.

4. ALTERNATIVES TO THE PROPOSED ACTION

These proposed rules are an extension of earlier rules published for U. S. tank vessels in domestic trade. The alternatives to the course of action adopted by the Coast Guard and future actions planned by the Coast Guard (including the publication of rules for U. S. tankers in foreign trade and foreign tankers) are discussed on pages 58-82 of reference (1).

There are two other questions to be resolved:

(1) What discharge criteria should the regulations make applicable to foreign vessels while on the high seas and trading with the United States?

(2) What stability criteria should be applied to foreign tankers?

3. Establish discharge criteria for foreign vessels which are the same as those for U. S. vessels (i.e., the same ones that will be effective when the 1973 Marine Pollution Convention comes into force.) Make adherence to these discharge criteria a condition of entry for vessels transporting oil to or from U. S. ports.

Discussion of alternatives

Alternative 1 would do nothing to reduce present oil inputs or to encourage adoption of the 1973 Marine Pollution Convention by other countries. It involves no new enforcement nor legal problems with regard to foreign ships. It does not treat U. S. ships in foreign trade the same as foreign vessels with respect to performance standards even though these two classes of ships would be treated the same with respect to construction and equipment standards.

Alternative 2 might encourage some vessels trading with the U. S. which would not otherwise do so to use LOT/ROB techniques and thus reduce oil inputs. Its effect would depend on the vigor with which its enforcement was pursued. It would involve extra boardings to check records.

Alternative 3 would offer the greatest potential for oil outflow reduction but is not feasible from a legal standpoint. Present jurisdiction is inadequate to set and enforce discharge criteria for foreign ships beyond the contiguous zone, 12 miles from the nearest U. S. land. Alternative 3 must, therefore, be rejected.

The Coast Guard believes a combination of alternatives 1 and 2 is the best available alternative for establishing discharge criteria for foreign vessels, and that is the alternative chosen. The proposed regulations do not change the discharge criteria currently applicable to foreign tankers.

Subdivision and stability criteria for foreign tank vessels

A decision on what subdivision and stability criteria should be made applicable to foreign tank vessels entering U. S. navigable waters is also required. The international standards for tank vessel subdivision and stability currently in effect are those contained in the International Convention on Load Lines, 1966. Ambiguity in that agreement has resulted in some difference in interpretation among nations as to the subdivision and stability requirements for vessels while in a partially loaded condition. The United States construes the 1966 Load Line Convention to require two-compartment subdivision on tankers in partially-loaded as well as fully-loaded conditions, while some other parties to the Convention felt one-compartment subdivision was adequate to meet the requirements

for partially-loaded conditions. This difference in interpretation was resolved and language clearly requiring two compartment subdivision in all loading conditions was incorporated into the 1973 Marine Pollution Convention, (which has not come into force). A decision must be made whether U. S. regulations for foreign tankers should retain provisions contained in present international law (the 1966 Load Line Convention) or impose requirements of 1973 Marine Pollution Convention before that agreement comes into effect.

The Coast Guard believes that where international requirements resulting from an international agreement to which the U. S. is a party cover a particular problem area, the U. S. should not issue different regulations applicable to foreign ships unless the international standards do not provide an adequate level of safety. In the case of subdivision and stability requirements for tank vessels, the current international standards do provide an adequate level of safety, the Coast Guard has decided that foreign vessels will not be required to comply with the requirements of regulation 157.21 concerning subdivision and stability. Instead, these vessels must comply with recognized international law in this area, the International Convention on Load Lines, 1966.[6]

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[6] Further discussion of subdivision and stability requirements may be found in responses to comments on page

5. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The overall effect of these regulations will be to reduce the amount of oil entering the oceans as indicated in Section 3. No adverse environmental effects are anticipated as a result of this action.

6. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Both short-term and long-term fates and effects of petroleum hydrocarbons in the marine environment are analyzed in the NAS Report, Petroleum in the Marine Environment (reference 2). So far as the Coast Guard can determine, these regulations do not involve any tradeoffs between short-term environmental gains at the expense of long-term losses or vice versa. Nor are any future options foreclosed.

AD-A034 688 COAST GUARD WASHINGTON D C OFFICE OF MERCHANT MARINE--ETC F/G 13/10
ACTIVITIES RELATING TO TITLE II PORTS AND WATERWAYS SAFETY ACT --ETC(U)
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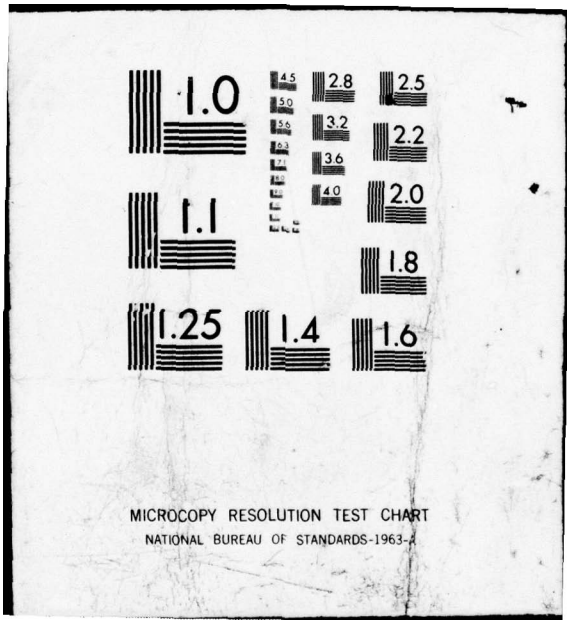
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7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No significant irreversible and irretrievable commitments of resources are involved in this proposed action.

8. COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND COAST GUARD RESPONSES

Comments on the draft statement were requested from the agencies and groups listed below. An asterisk (*) indicates comments were received and are included in this section.

*Department of the Interior
*Environmental Protection Agency
*Department of Defense
*Department of Commerce
*Department of Transportation
*Department of State
Sierra Club
Connecticut Citizens Action Group
*Center for Law and Social Policy
American Petroleum Institute
American Institute of Merchant Shipping
American Association of Port Authorities
American Maritime Association
American Waterways Operators, Inc.
Shipbuilders Council of America
Environmental Policy Center
Coalition Against Oil Pollution
National Audubon Society

In addition, comments were received from the following groups:

State of New Jersey
Shell International Marine Ltd.
Imperial Oil Limited
Oil Companies International Marine Forum
International Chamber of Shipping

In preparing the final EIS, the Coast Guard has included comments which fall into the following categories:

1. Comments from people who <u>say</u> their comments are applicable to the EIS.

2. Comments from the regulatory docket file (75-240) which also mention the draft EIS.

3. Significant comments from the regulatory docket file which cover important issues addressed in EIS.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 22 1976

PEP ER-76/462

JUN 18 1976

Dear Sir:

The Department has completed its review of the draft environmental statement for Regulations for U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States. We have no specific comments to offer regarding this statement.

Many of the environmental implications of the new 33 CFR 157 regulations were discussed previously in the Coast Guard's final environmental statement released in August 1975 which addressed domestic tanker operations in U.S. waters.

We feel the extension of these criteria to U.S. tankers carrying oil in foreign trade and foreign vessels carrying oil in U.S. waters represents a significant step towards reducing a major source of marine pollution.

Sincerely yours,

Stanley R. Bereman

Deputy Assistant Secretary of the Interior

Executive Secretary
Marine Safety Council
U.S. Coast Guard (G-CMC/81)
Washington, D.C. 20590

RESPONSE

Comment acknowledged. No response necessary.

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

30 JUN 1976

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUL 02 1976

OFFICE OF THE
ADMINISTRATOR

Executive Secretary
Marine Safety Council
U.S. Coast Guard (G-CMC/81)
Washington, DC 20590

Dear Sir:

The Environmental Protection Agency, pursuant to its responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, has reviewed the Coast Guard's Draft Environmental Impact Statement (DEIS) entitled "Regulations for US Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States." The DEIS appears to have adequately analyzed the expected environmental impacts associated with the proposed action.

We suggest that the final EIS include a clearer account of which sections of the prior regulations would apply to foreign vessels, and which would not. Also, a copy of the existing regulations and the proposed revisions should be included in the final version. We also suggest that the final EIS include a more complete summary of the environmental effects of the proposed action. Especially helpful would be the addition of tables, similar to Table 3, showing estimated oil inputs to the oceans from foreign vessels trading in US navigable waters and from US vessels in domestic trade, and the effect of these regulations in reducing them. We are assigning a rating of LO-1 (lack of objections--adequate) to the EIS. An explanation of our rating system is enclosed.

Thank you for the opportunity to provide these comments.

Sincerely yours,

Rebecca W. Hanmer

Rebecca W. Hanmer
Director
Office of Federal Activities

Enclosure

DEFINITIONS OF CODES FOR THE GENERAL NATURE OF EPA COMMENTS

ENVIRONMENTAL IMPACT OF THE ACTION

LO--Lack of Objection

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these impacts.

EU-Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

ADEQUACY OF THE IMPACT STATEMENT

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or

Response to comments by the

Environmental Protection Agency

contained in a letter dated 30 June 1976

COMMENT

The final EIS should include a clearer account of which sections of the prior regulations would apply to foreign vessels, and which would not.

RESPONSE

Applicability of regulations to foreign vessels is indicated in Table 1, page 5.

COMMENT

A copy of the existing regulations and the proposed revisions should be included in the final EIS.

RESPONSE

Appendix B incorporates proposed changes to 33 CFR 157 appearing in the April 15, 1976, Notice of Proposed Rule Making.

COMMENT

The final EIS should include a more complete summary of the environmental effects of the proposed action. Especially helpful would be the addition of tables, similar to Table 3, showing estimated oil inputs to the oceans from foreign vessels trading in U. S. navigable waters and from U. S. vessels in domestic trade, and the effect of these regulations in reducing them.

RESPONSE

Table 3 has been expanded to include information on foreign vessels trading into U. S. waters. Information on oil inputs from U. S. tankers in domestic trade and estimated effects of carrier regulations on those inputs are described on pages 41 through 52 of reference 1.

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-CWR-P

14 JUN 1976

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 18 1976

Executive Secretary
Marine Safety Council
U.S. Coast Guard (G-CMC/81)
Washington, D.C. 20590

Dear Sir:

I have reviewed the Department of Transportation's Draft EIS on regulations for U.S. tank vessels which carry oil in foreign trade and foreign tank vessels that enter the navigable waters of the United States. I do not find any impacts with respect to the Corps of Engineers' Civil Works areas of responsibility.

I would appreciate receiving a copy of the Final EIS when it becomes available.

Sincerely yours,

JOHN R. HILL, JR.
LTC, Corps of Engineers
Assistant Director of Civil Works,
Environmental Programs

RESPONSE

Comment acknowledged. No response necessary.

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

MARINE SAFETY COUNCIL
STAFF
RECEIVED

JUN 3 1976 CG

June 1, 1976

Executive Secretary
Marine Safety Council
U. S. Coast Guard (G-CMC/81)
Washington, D. C. 20590

Dear Sir:

The draft environmental impact statement entitled "Regulations for U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States," has been received by the Department of Commerce for review and comment. The statement has been reviewed and the following comments are offered for your consideration.

Page 19 refers the reader to reference (a) for a discussion of the economic impacts of the proposed action. Since reference (a) addresses U.S. flag tank vessels in the domestic trade, it is suggested that additional discussion of the economic impacts be made. Possible problem areas are outlined below.

a. The economic impact of imposing the subject regulations upon U.S. flag tankers operating strictly in the foreign trade has not been considered. Since tank vessels operating from foreign port to foreign port do not enter U.S. navigable waters, U.S. tankers in this trade could be at a competitive disadvantage with respect to their foreign counterparts.

b. The proposed subdivision and stability requirements of 157.21 apply to U.S. flag tank vessels but not to foreign flag tankers. Instead, foreign flag vessels must comply with the recognized international law of this area, the 1966 International Convention on Load Lines. Since the proposed requirements of 157.21 are significantly more stringent than the 1966 Load Line Convention as interpreted by many countries, a competitive disadvantage could be incurred by U.S. flag tankers.

c. Concerning the increase in costs to the consumer of petroleum products, it is stated on page ii that "increased transportation costs are estimated to be less than 0.2 cents per gallon." This information is extracted from Table 9 of reference (a) and implies that the increased cost to the consumer will be less than 0.2 cents per gallon for specific petroleum products such as automotive gasoline and residual fuel oil. The draft environmental impact statement contains no discussion of the relationship between required freight rate and consumer costs.

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

The data presented in Table 3, page 20, do not completely reflect those presented in Appendix A. It is suggested that Table 3 include estimated oil discharge data for foreign tank ships that enter U.S. navigable waters based on the assumption that these foreign tankers will comply with the discharge criteria applied to U.S. vessels.

In order to further amplify Item 2 on page 22, it would be well to include what percentage of tankers now in use on a world-wide basis comply with the 1969 Amendments to the 1954 Marine Pollution Convention (which contains discharge criteria similar to those proposed by the 1973 Marine Pollution Convention).

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving thirteen (13) copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 14 1976

UNITED STATES DEPARTMENT OF COMMERCE
Maritime Administration
Washington, D.C. 20230

June 4, 1976

Rear Admiral William M. Benkert
Chief, Office of Merchant Marine Safety
U.S. Coast Guard
400 Seventh Street, S.W.
Washington, D.C. 20590

Subject: U.S. Coast Guard Tanker Pollution Prevention Regulations in 33 CFR 157 - Proposed Amendments Addressing U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels Carrying Oil in U.S. Navigable Waters

Dear Admiral Benkert:

The subject proposed rule making, as published in the Federal Register of April 15, 1976, has been reviewed by the Maritime Administration and comments are hereby forwarded. The following comments address two areas of possible adverse economic impact on U.S. flag vessels imposed by the subject proposed rules.

1. Section 157.01

The economic impact of the proposed regulations upon U.S. flag tankers operating strictly in foreign to foreign trade should be considered before promulgating final rule making. Since tank vessels operating from foreign port to foreign port do not enter U.S. navigable waters, U.S. tankers in this trade could be at a competitive disadvantage with respect to their foreign counterparts. It is suggested, therefore, that consideration be given to the alternative of modifying the application of these regulations to U.S. flag tank vessels operating strictly in such foreign trade. Those owners anticipating possible operation in U.S. waters would certainly have the incentive to build in compliance with the proposed rules considering the cost of retrofit.

2. Section 157.21

It is noted that the proposed subdivision and stability requirements of Regulation 157.21 apply to U.S. flag tank vessels but not to foreign flag tankers. Instead, foreign flag tankers are required to comply with the recognized international regulations in this area, the 1966 International Convention on Load Lines.

Since the proposed requirements of Section 157.21 are significantly more stringent than the 1966 Convention standards as interpreted by many countries, there is some question concerning the adequacy of the 1966 Convention as compared to the subdivision and stability requirements being proposed for U.S. flag tankers. It would be prudent to apply the proposed requirements of Section 157.21 to both U.S. and foreign flag tank vessels for the following reasons:

- These requirements are intended to prevent the total loss of a vessel from a casualty and a subsequent massive oil spill. If the 1966 Load Line Convention requirements were considered to be adequate in this regard, there would have been no need to propose Regulation 157.21 nor to incorporate the two-compartment standard of subdivision into the 1973 Marine Pollution Convention.

- Since Regulation 157.21 is significantly more stringent than the 1966 Load Line Convention as interpreted by many countries, the unilateral application of these requirements to U.S. flag tankers will place such vessels at a competitive disadvantage relative to their foreign counterparts.

I hope that these comments are of assistance in preparing effective amendments to the tanker pollution prevention regulations.

Sincerely,

JOHN J. NACHTSHEIM
Assistant Administrator for Operations

Response to comments by the

Department of Commerce

contained in letters dated June 1, 1976, and June 4, 1976

COMMENT

It is suggested that additional discussion of the economic impacts be made. Possible problem areas are:

a. The economic impact of the regulations on U. S. flag tankers operating strictly in trade between foreign ports has not been considered. U. S. tankers in such trade could be at a competitive disadvantage with respect to their foreign counterparts. The Coast Guard should consider excluding U. S. tanker vessels operating exclusively in trade between foreign ports from these proposed regulations.

RESPONSE

It appears that the proposed regulations will increase the competitive disadvantage U. S. flag tankers operating strictly in trade between foreign ports face with respect to vessels of other nations operating in the same trade. The Coast Guard believes this increase in competitive disadvantage will be slight and of a relatively short-term nature.

The following factors will contribute to differences in cost of transportation on U. S. tankers and foreign tankers trading exclusively between foreign ports:

- New U. S. tankers must be constructed to meet segregated ballast distribution requirements in 157.09(d) and foreign tankers do not. (It is assumed that all new tankers, both U. S. and foreign, will be built with segregated ballast. It appears unlikely that an owner would risk building a new tanker without segregated ballast which would become obsolete and have to be removed from service or extensively modified when the 1973 Marine Pollution Convention comes into force.) There will be some small increase in both capital cost and operating cost to provide segregated ballast distribution on new U. S. tankers.

• Both new and existing U. S. vessels must have slop tanks, oil discharge monitoring and control systems and other design and equipment features and comply with vessel operating requirements indicated in Table 1, pages 5 and 6, while their foreign counterparts may not have to until the 1973 Marine Pollution Convention comes into force. (Note, though, that approximately half of the world's tankship fleet is required to observe the discharge requirements in the 1969 Amendments, since their flag states have implemented those requirements.) This will result in expenditure of a one-time modification cost and some small difference in operating cost--at least until the 1973 Marine Pollution Convention requirements become applicable to all foreign ships.

There are only a few U. S. tankers operating strictly in foreign-to-foreign trade (approximately six vessels), and the Coast Guard expects these vessels will shift to foreign-to-U. S. trade as soon as U. S. deepwater ports are completed. The Coast Guard believes the economic impact on these vessels will be small and of a temporary nature (until the 1973 Marine Pollution Convention comes into force).

Since the law does not allow a distinction to be drawn between pollution prevention requirements for U. S. ships in foreign-to-U. S. trade and U. S. ships in foreign-to-foreign trade, the suggested exclusion of foreign-to-foreign vessels is not considered feasible.

COMMENT

b. The subdivision and stability requirements in proposed Section 157.21 should be applied to foreign flag tank vessels entering U. S. waters as well as to U. S. flag tank vessels because

(1) the subdivision and stability requirements contained in the 1966 Loadline Convention are inadequate, and

(2) failure to do so will place U. S. flag tankers engaged in foreign trade at a competitive disadvantage relative to foreign tankers.

RESPONSE

The Coast Guard has considered and rejected the action recommended for the following reasons:

(1) The Coast Guard does not consider the 1966 Loadline Convention subdivision and stability requirements inadequate compared to the 1973 Convention requirements. Both are adequate and, in fact, the only differences in interpretation involve requirements for the partially-loaded condition. Requirements for fully-loaded tankers, such as would be coming to the U. S., are the same, and both sets of requirements provide equivalent safety as far as waters around the U. S. are concerned.

(2) Even given the possible differences in interpretation of requirements in the 1966 and 1973 Conventions for partially-loaded conditions, the presence or absence of competitive disadvantage is largely a function of how the designer chooses to meet the requirements. The Coast Guard believes no serious competitive disadvantage will result from these small differences in stability requirements.

COMMENT

c. The draft environmental impact statement contains no discussion of the relationship between required freight rate and consumer costs.

RESPONSE

A discussion of the relationship between required freight rate and consumer costs has been added as part of the expanded analysis of economic impacts on pages 20-27.

COMMENT

The data presented in Table 3, page 20, do not completely reflect those presented in Appendix A. It is suggested that Table 3 include estimated oil discharge data for foreign ships that enter U. S. navigable waters based on the assumption that these foreign tankers will comply with the discharge criteria applied to U. S. vessels.

RESPONSE

Table 3 has been expanded to include estimates of oil inputs from foreign tankships and reductions resulting from new discharge standards.

COMMENT

In order to further amplify Item 2 on page 22 (recognition of implementation of 1969 Amendments by six countries) it would be well to include what percentage of tankers now in use on a world-wide basis comply with the 1969 Amendments to the 1954 Marine Pollution Convention (which contains discharge criteria similar to those proposed by the 1973 Marine Pollution Convention).

RESPONSE

The Coast Guard knows of no authoratative estimates of what portion of the world's tankship fleet is currently complying with the discharge criteria of the 1969 Amendments. The section of the EIS on discharge criteria alternatives has been revised to include information on percentages of the world's tankship fleet registered with the countries which have adopted and implemented the 1969 Amendments--see page 29.

Form DOT F 1320.1 (1-67)

UNITED STATES GOVERNMENT

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE SECRETARY

Memorandum

DATE: 4 MAY 1976

In reply refer to:

SUBJECT: Draft Environmental Impact Statement "Regulations for U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States"

FROM: Assistant Secretary for Environment, Safety, and Consumer Affairs

TO: Chief Environmental Impact Branch G-WEP-7/73

We have completed review of the above draft environmental impact statement (EIS), and have the following comments:

1. The referencing of an earlier EIS pertaining to U.S. tankers in domestic trade has aided the development of a concise EIS. However, a careful review of the topics referenced should be made in order to assure that the earlier EIS contained adequate analysis for the current case. Particular attention should be given to economic analyses in this regard.

2. It is suggested that the applicability of the proposed regulations to tankers calling at U.S. deepwater ports be discussed in the final EIS, inasmuch as the deepwater ports may be located beyond the 12-mile contiguous zone.

3. While compliance assurance for foreign tankers is discussed briefly on page 22, the final EIS should contain a more complete description of current and proposed Coast Guard measures to assure that both U.S. and foreign vessels comply with discharge standards.

4. Considering the complex nature of the intertwined U.S. and international rules, the use of comparison tables is a helpful, clarifying device for the layman. We suggest, however, that the explanations given in the text be sufficiently complete to avoid confusion that may result for persons unfamiliar with these standards. For example, different uses of the term "navigable waters" should be clearly defined.

5. The final EIS should include a copy of the final version of the rules being promulgated.

Certain other detailed comments have been provided by the Office of Environmental Affairs to LCdr. Warren Snider, Office of Merchant Marine Safety.

We appreciate the opportunity to review the draft EIS, and we look forward to receiving the final statement including comments received on the draft.

Judith T. Connor

Response to comments by the

Department of Transportation

contained in DOT memorandum dated May 4, 1976

COMMENT

A careful review of the topics referenced in the earlier EIS should be made to ensure that the earlier EIS contained adequate analysis for the current case. In this regard, particular attention should be given to economic analysis.

RESPONSE

References to the earlier EIS were reviewed as suggested by the commenter with results shown in the table on the next page.

As a result of this review and comments on the draft statement, expanded discussion of economic impacts of the proposed action appears on pages 20-27 of the final statement.

RESULTS OF REVIEW OF DRAFT EIS REFERENCES TO EARLIER FINAL EIS ON TANKERS IN DOMESTIC TRADE

Topic	Page reference in draft EIS	Reference in previous final EIS	Remarks
Detailed description of requirements of proposed regulations	4	Section 2.3	Note 1
Info on need for regs & oil inputs from tankers	15	Pages 23-41	Note 1
Description of process used to assess effects of regulations	15	Pages 41-52	Note 1
Effect of measures other than LOT on oil inputs	19	Pages 42-52	Note 1
Economic impact, technical feasibility, and safety impact	19	Pages 53-57	Note 2
Alternatives to proposed action	21	Pages 58-82	Note 1

Note 1. The info presented in the previous EIS (ref 1) adequately covers the current proposed action.

Note 2, Discussion of economic impact needs revision.

COMMENT

Applicability of the proposed regulations to tankers calling at U. S. deepwater ports should be discussed in the final EIS.

RESPONSE

Although deepwater ports would not be considered "navigable waters of the U. S.", the possibility exists that vessels that call at these ports may become subject to these and other regulations by virtue of a broad interpretation of section 19 of the Deepwater Ports Act of 1974 (Pub. Law 93-627, 88 Stat. 2126, 33 U.S.C. 1501) or by the action of the licensee of the port as a condition of operation.

COMMENT

The final EIS should contain a more complete description of current and proposed Coast Guard measures to assure both U. S. and foreign vessels comply with discharge standards.

RESPONSE

A discussion of Coast Guard marine environmental protection enforcement and surveillance activities has been added on pages 14-15.

COMMENT

We suggest that the explanations given in the text (as opposed to the tables) of the EIS be sufficiently complete to avoid confusion that may result for persons unfamiliar with these standards. For example, different uses of the term "navigable waters" should be clearly defined.

RESPONSE

A definition of "navigable waters" has been added in a footnote on page 2 This same meaning applies wherever the term is used in the statement.

COMMENT

The final EIS should include a copy of the final version of the rules being promulgated.

RESPONSE

Appendix B contains the rules in 33 CFR Part 157 as they will appear after incorporating changes to be published by the Coast Guard as a final rulemaking.

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 2 1976

DEPARTMENT OF STATE

Washington, D.C. 20520

BUREAU OF OCEANS AND INTERNATIONAL
ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

May 26, 1976

Executive Secretary
Marine Safety Council
U.S. Coast Guard (G-CMC/81)
Washington, D.C. 20590

Dear Sir:

The Department of State has no objection to, and no comments on, the draft Environmental Impact Statement on Regulations for U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States.

We appreciate the opportunity to review the draft.

Sincerely,

Donald R. King
Acting Director
Office of Environmental Affairs

cc: CEQ (5 copies)

RESPONSE

Comment acknowledged. No response necessary.

CENTER
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1751 N STREET N W WASHINGTON D C 20036 202 872-0670

MARINE SAFETY COUNCIL
STAFF
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James W Ellis
Roger S Foster
Richard A Frank
Paul R Friedman
L Thomas Galloway
Paul Gewirtz
Eldon V C Greenberg
Marcia D Greenberger
Michael C Harper
Leonard D Mayo
Joseph Onek
Robert Pitofsky
Mary A Rose
Louis Schroeder
Edward P Scott
Herbert Semmel
Attorneys-at-Law

June 9, 1976

Executive Secretary
Marine Safety Council
(G-CMC/81)
Room 8117
United States Coast Guard
Washington, D.C. 20590

CGD 75-240

Dear Sir:

In accordance with the Notice of Proposed Rulemaking Regarding the Construction and Equipment of Certain Tank Vessels Carrying Oil (CGD 75-240), published in the Federal Register on April 15, 1976 (41 Fed. Reg. 15859), I request that my statement at the hearing held on May 20, 1976, be treated as the written submission of my clients in the rule-making proceeding. If you need further copies of such statement, please advise me, and I will be happy to supply them for the record.

One additional point might be made with respect to enforcement of international discharge standards against foreign flag vessels. A review of the proceedings at the 1973 International Conference on Marine Pollution reveals that there was a general recognition that port state enforcement might be appropriate in order to ensure compliance with the international standards negotiated at such Conference. Thus, it is likely that United States action under the Ports and Waterways Safety Act would not be viewed by the international community as an unwarranted and unexpected assertion of unilateral jurisdiction.

Thank you for consideration of our views in this rulemaking.

Sincerely,

Eldon V.C. Greenberg

Counsel to Natural Resources Defense Council, Inc., the Sierra Club, The Wilderness Society, The National Wildlife Federation, The National Audubon Society, The Environmental Defense Fund, Friends of the Earth, and The National Parks and Conservation Association

CMC/51 DHS

TESTIMONY OF ELDON V.C. GREENBERG ON BEHALF OF THE NATURAL RESOURCES DEFENSE COUNCIL, THE SIERRA CLUB, THE WILDERNESS SOCIETY, THE NATIONAL WILDLIFE FEDERATION, THE NATIONAL AUDUBON SOCIETY, THE ENVIRONMENTAL DEFENSE FUND, FRIENDS OF THE EARTH, AND THE NATIONAL PARKS AND CONSERVATION ASSOCIATION ON PROPOSED RULES FOR THE CONSTRUCTION AND EQUIPMENT OF TANK VESSELS IN FOREIGN TRADE (CGD75-240) PRESENTED ON MAY 20, 1976, TO THE UNITED STATES COAST GUARD

I am Eldon Greenberg of the Center for Law and Social Policy, a public interest law firm.[1/] I am pleased to appear today to provide the views of the Natural Resources Defense Council, the Sierra Club, the Wilderness Society, the National Wildlife Federation, the National Audubon Society, the Environmental Defense Fund, Friends of the Earth, and the National Parks and Conservation Association (the "environmental groups")[2/] with respect to the Coast Guard's proposed amendments to its tank vessel regulations, 33 C.F.R. Part 157, to extend their

1/ The Center's address and telephone number are: 1751 N Street, N.W., Washington, D.C. 20036; (202) 872-0670.

2/ NRDC, whose principal office is at 15 West 44th Street, New York, N.Y. 10036, and has additional offices in Washington, D.C. and Palo Alto, Calif., has a membership of approximately 18,000 persons. The Sierra Club, whose principal place of business is at 530 Bush Street, San Francisco, Calif. 94104, has a membership of approximately 160,000 persons. The Wilderness Society, which has its principal office at 1901 Pennsylvania Avenue, N.W., Washington, D.C. 20006, and a field office in Denver, Colorado, has a membership of about 90,000 persons. NWF, whose principal place of business is 1412 16th Street, N.W., Washington, D.C. 20036, is composed of associate members and members of state affiliate member organizations, comprising over 2,000,000 persons. The National Audubon Society, which has its principal office at 950 Third Avenue, New York, N.Y. 10022, has a membership of more than 340,000 persons. EDF, whose principal place of business is 162 Old Town Road, East Setauket, N.Y. 11733, has a membership of approximately 55,000 persons and a 700 member Scientists' Advisory Committee. FOE, whose principal place of business if 529 Commercial Street, San Francisco, Calif. 94111, has a membership of 20,000 persons. NPCA, whose principal office is 1701 18th Street, N.W., Washington, D.C. 20009, has a membership of approximately 45,000 persons.

coverage to U.S. flag tankers engaged in foreign trade, and foreign flag tankers entering U.S. navigable waters (CGD 75-240), as set forth in the Federal Register notice of April 15, 1976 (41 Fed. Reg. 15859) (the "proposed rules"). All the environmental groups are national, non-profit membership organizations deeply concerned and knowledgeable about the preservation and protection of the marine environment. They have each taken an active interest in the development of standards for the design and operation of oil carrying vessels, and I have been asked by them to coordinate the presentation of their views on the proposed rules.

Because the proposed rules are, except in one or two respects, essentially the same as the regulations adopted by the Coast Guard in October, 1975 (40 Fed. Reg. 48279) and January, 1976 (41 Fed. Reg. 1479) for oil tankers in domestic trade, I do not intend this morning to focus upon the details of the regulatory requirements themselves. The environmental groups' criticisms of the adequacy of such requirements have been expressed on many previous occasions,[3/] and are well-known. Rather, I would like to discuss two basic policy questions raised by the proposed rules: (1) whether the Coast Guard should be confined to the requirements of the International Convention for the Prevention of Pollution from Ships, 1973 (the "1973 Convention") in establishing design and equipment standards for oil tankers in internationa

3/ Seven of the groups in fact currently contesting the adequacy of such regulations in a lawsuit pending in the United States District Court for the District of Columbia (Natural Resources Defense Council, Inc., et al. v. William T. Coleman, Jr., et al., Civ. Action No. 76-0131).

trade; and (2) whether the Coast Guard should limit its enforcement of generally accepted international discharge standards against foreign flag tankers, to situations when the violations occur in U.S. territorial waters or whether it should enforce such standards also when a violation of such standards occurs outside U.S. territorial jurisdiction.

(1) Application of Standards Additional to Those of the 1973 Convention -- It has been, and continues to be, an article of faith at the Coast Guard that the United States should only adopt regulations for U.S. flag tankers in foreign trade and foreign flag tankers entering our ports which are "consistent with" the 1973 Convention. The Coast Guard's position, as set forth in its Final Environmental Impact Statement on Regulations for Tank Vessels Engaged in the Carriage of Oil in Domestic Trade, issued in August, 1975 (hereafter cited as "CGEIS"), is that pollution is an international problem and, if the United States should move to impose standards additional to those embodied in the 1973 Convention, not only could the future of that Convention be cast in doubt, but so, too, would be most hopes for international solutions in the area of marine pollution. Indeed, the Coast Guard has gone so far as to state that because ship source pollution is "best attacked in an international context," unilateral action should only be taken "when international solutions are impossible or inappropriate" (40 Fed. Reg. 48280).

While the environmental groups agree with the Coast Guard that international agreements are desirable, we believe that it would be counter-productive to limit U.S. standards to those embodied in the 1973 Convention. Such a policy may in the end result in the sacrifice of our own environment and perhaps the world environment for the sake of an international agreement which may never be generally adopted. We reach this conclusion for two basic reasons:

First, whatever action the United States takes, the 1973 Convention does not appear likely to enter into force in the near future. Today, two and one-half years after it was opened for signature, only two countries -- Jordan and Kenya, neither of which is a significant maritime power -- have ratified the 1973 Convention. Before it could actually enter into force, no less than 15 states, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant shipping, must become parties (1973 Convention, Article 15, paragraph 1). When, if ever, this will occur is uncertain. Indeed, because of the costly requirements of the 1973 Convention with respect to the provision of reception facilities for oily residues and oily mixtures, the future of the Convention is particularly clouded.

Second, there are a number of areas in which there has been neither international discussion nor international agreement. It is difficult to understand how progressive United States action in such areas would undermine the chances of the 1973 Convention being adopted, or, for that matter, the chances of new agreements being reached. For example, if, as contemplated by the Ports and Waterways Safety Act, the United States were to establish standards for maneuverability or stopping ability -- subjects not addressed in the 1973 Convention or any other existing agreements -- U.S. regulatory initiatives would not, in our view, be taken by the international community as a "signal' that the United States intended to impose additional requirements in those areas in which international agreements have been or could be reached. In point of fact, taking the initiative in this way, perhaps in order to galvanize the international community to take similar

Sea Conference. See Revised Single Negotiating Text, Part III, Article 28, A/Conf. 62/WP.8/.1/Part III (May 6, 1976). For the United States to step out in front by actually putting such a port state scheme into effect would not only have a beneficial effect in terms of pollution control but would perhaps hasten the general acceptance of port state enforcement.[8/]

Finally, the three reasons advanced by the Coast Guard in its draft environmental impact statement on the proposed rules as mitigating the absence of operational standards for foreign flag vessels are unpersuasive. First, the mere fact that a vessel must have necessary pumping, piping and discharge arrangements, and even a discharge monitoring and control system, so as to engage in load-on-top operations, does not ensure that discharges will be within applicable limits. Load-on-top operations are only partly effective, and there are numerous situations, e.g., short ballast voyages, rough sea conditioning, see CGEIS at 40, in which such operations cannot be carried on with any degree of success. In these situations, the temptation may well be to discharge in violation of international standards, regardless of any equipment, piping, and discharge arrangements on board. Second, th "many flag states are in fact requiring that their vessels comply with the 1969 Amendments" scarcely begins to solve the problem of operational

8/ To the extent that port state enforcement poses the risk of conflict with flag states, appropriate safeguards for flag state interests might also be devised, along the lines of those being considered at the Law of the Sea negotiations, such as suspension of port state proceedings in the event that the flag states initiate proceedings for the same violation. See Revised Single Negotiating Text, Part III, Articles 33-42, A/Conf. 62/WP.8/Rev. 1/Part III (May 6, 1976). Any specific U.S. safeguards established in the interim period before entry into force of the Law of the Sea Treaty could, of course, be replaced by the international safeguards, if different, once the Treaty goes into effect.

be made, however, is that this proposal reflects an understanding of our need and ability not to be bound by the four corners of the 1973 Convention, but, to establish where appropriate, additional standards to deal with the whole range of risks associated with the marine transport of oil. We would suggest that, in areas such as tanker maneuverability and stopping ability, similar, forward thinking action can and should be taken.

(2) Enforcement of Generally Accepted International Discharge Standards -- Operational pollution is the basic focus of the proposed rules. Nevertheless, such rules fall short of what might be achieved, even if the Coast Guard feels constrained by the standards of the 1973 Convention, because they contain no provision for enforcing violations of discharge standards outside U.S. territorial waters against foreign flag vessels. Because of the well-known and likely long-term glut in the tanker market, see generally Mueller, The Worldwide Need for Tankers (Paper Presented at the Seatrade Conference on Money and Ships, London, March 18, 1975), the Coast Guard's regulations providing for incorporation of segregated ballast capacity (33 C.F.R. §157) are likely to have little impact on operational pollution because a retrofit requirement is not included.[4/] Consequently, there is a pressing need to take as effective action as possible with respect to operational pollution from existing tankers.

4/ As far as retrofit of segregated ballest is concerned, the environmental groups note that the Coast Guard's Advance Notice of Proposed Rulemaking of May 13, 1976 (41 Fed. Reg. 19672) indicates that such a possibility is under active consideration, and we urge that every effort be made to act on this matter on a priority basis.

In 1974, world trade in petroleum shipped by tanker averaged to 35 million barrels per day; of this amount, some 5.4 million barrels per day were carried to the United States, almost exclusively (94%) by foreign flag tankers. See generally Office of Technology Assessment, Oil Transportation by Tankers: An Analysis of Marine Pollution and Safety Measures, 8-14 (July, 1975). In other words, one-sixth to one-seventh of the total oceanborne transport of petroleum was destined for the United States. U.S. enforcement of operational requirements on foreign flag tankers, would, therefore, be highly significant, even in a global pollution context.

Although the Coast Guard, in its draft environmental impact statement on the proposed rules indicates (at pages 23 and 24) that making adherence to discharge criteria a condition of entry to U.S. ports "would offer the greatest potential for oil outflow reduction," it nevertheless rejects this alternative as "not feasible from a legal standpoint," indicating in the notice of proposed rulemaking that such action would involve "a disputable extension of United States legal authority and jurisdiction" (41 Fed. Reg. 15860).[5/] The environmental groups believe that the Coast Guard has not only framed the issue in an unfortunate way, but that discharge standards may be enforced against foreign flag vessels consistent with domestic and existing international law, as well as emerging international law.

To frame the issue in terms of application of U.S. standards is misleading. The standards in the proposed rules have not

5/ Given the desirability of this alternative, it plainly deserves more that the summary one page treatment given it in the draft impact statement. All its ramifications should be fully explored before any final action is taken.

been unilaterally developed by the United States. They are international standards derived from the 1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, 12 U.S.T. 2989, T.I.A.S. 4900, 327 U.N.T.S. 3, as amended, 17 U.S.T. 1523, T.I.A.S. 6109, 600 U.N.T.S. 332, and the 1973 IMCO Convention. The issue, in other words, is more properly framed in terms of U.S. enforcement of generally accepted international standards, rather than U.S. standard setting as such. If the proposed action is limited to enforcement only of international standards, any contention that such action represents a unilateral extension of standard setting jurisdiction is unfounded.

In any event, it seems clear that the United States does have the power under existing domestic and international law to enforce discharge criteria against foreign flag vessels when violations of such criteria occur outside the territorial jurisdiction of the United States. The Ports and Waterways Safety Act authorizes such exercise of jurisdiction. The Act gives the Coast Guard authority to establish rules and regulations for the operation of all vessels which enter U.S. navigable waters.[6/] Such authority does not depend upon where the violation occurs. Jurisdiction attaches when the vessel enters U.S. navigable waters. Moreover, Section 201 (13) of the Ports and Waterways Safety Act gives the Coast Guard authority to exclude "non-complying" vessels from U.S. navigable waters. Exercise

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6/ Section 201(1) provides, "That it is necessary that there be established for all such vessels documented under the laws of the United States or entering the navigable waters of the United States comprehensive minimum standards of design, construction, alteration, repair, maintenance, and operation to prevent or mitigate the hazards to life, property, and the marine environment.

of this authority is fully consistent with the United States' absolute right under international law to exclude vessels of foreign registry from its internal waters. See generally Burke, Contemporary Law of the Sea: Transportation, Communication and Flight 1 (Occasional Paper Series, Law of the Sea Institute, University of Rhode Island, November 1975)

> ("States claim complete authority to control access of vessels, both private and governmental, to internal waters, whether such waters are ports, bays, or areas beyond bays that may be useful as a route for international transport. In recent times some states wholly composed of islands make the claim that waters between the islands are internal. With respect to all waters claimed to be internal, the basic claim by coastal officials is to a discretionary authority to permit or to deny access as they may unilaterally decide.")

See also Whiteman, Digest of International Law, 186-188, 216-217, 250-251 (1965). If the United States can exclude foreign vessels from its ports for any reason whatsoever, a fortiori it can exclude them for discharges which occur outside of the territorial jurisdiction of the United States. 7/

The concept of port state enforcement of international discharge standards, if not already part of international law, certainly represents the emerging consensus. The United States has been one of its leading supporters internationally, and it is now specifically reflected in the revised Single Negotiating Text at the Law of the

7/ The remedy of exclusion should be distinguished, of course, from the imposition of monetary penalties and other remedies, where the legal basis for action under existing international law may be less well established. Denial of entry, however, may be a fairly effective remedy. Whereas monetary fines measured even in thousands of dollars might not deter polluters, denial of entry, when a cargo worth millions of dollars is involved, almost surely would.

Sea Conference. See Revised Single Negotiating Text, Part III, Article 28, A/Conf. 62/WP.8/.1/Part III (May 6, 1976). For the United States to step out in front by actually putting such a port state scheme into effect would not only have a beneficial effect in terms of pollution control but would perhaps hasten the general acceptance of port state enforcement.[8/]

Finally, the three reasons advanced by the Coast Guard in its draft environmental impact statement on the proposed rules as mitigating the absence of operational standards for foreign flag vessels are unpersuasive. First, the mere fact that a vessel must have necessary pumping, piping and discharge arrangements, and even a discharge monitoring and control system, so as to engage in load-on-top operations, does not ensure that discharges will be within applicable limits. Load-on-top operations are only partly effective, and there are numerous situations, e.g., short ballast voyages, rough sea conditioning, see CGEIS at 40, in which such operations cannot be carried on with any degree of success. In these situations, the temptation may well be to discharge in violation of international standards, regardless of any equipment, piping, and discharge arrangements on board. Second, th "many flag states are in fact requiring that their vessels comply with the 1969 Amendments" scarcely begins to solve the problem of operational

8/ To the extent that port state enforcement poses the risk of conflict with flag states, appropriate safeguards for flag state interests might also be devised, along the lines of those being considered at the Law of the Sea negotiations, such as suspension of port state proceedings in the event that the flag states initiate proceedings for the same violation. See Revised Single Negotiating Text, Part III, Articles 33-42, A/Conf. 62/WP.8/Rev. 1/Part III (May 6, 1976). Any specific U.S. safeguards established in the interim period before entry into force of the Law of the Sea Treaty could, of course, be replaced by the international safeguards, if different, once the Treaty goes into effect.

pollution. One of the major difficulties in the past with the international system of regulation of oil pollution has been that flag states have had exclusive enforcement jurisdiction. There is general recognition that flag state enforcement must be supplemented by other enforcement mechanisms if there is going to be any assurance that discharge criteria will not be violated with impunity. Third, the mere escalation in the value of oil is far from sufficient to deter willful violations of international standards. Although the cost of oil has escalated dramatically in the past two years, nonetheless, there is no proof that operational discharges have been reduced. Indeed, there is even a substantial percentage of the world fleet which still does not follow load-to-top procedures. Ultimately, the United States cannot rely on external forces to influence others to reduce their operational discharges; it must take action itself if it wishes to assure adequate protection of the marine environment.

Conclusion

In sum, the environmental groups believe that, with respect to the two basic policy questions raised in this rulemaking proceeding, the time has come to establish additional standards where needed and not addressed internationally and to enforce generally accepted international discharge standards against all vessels entering its navigable waters. Such vigorous action will help ensure that the mandate of the Ports and Waterways Safety Act will begin to be fulfilled.

Thank you.

* * *

Response to comments by the Center for Law and Social Policy contained in a statement presented by Mr. Eldon V. C. Greenburg at the public hearing on the proposed regulations held in Washington, D. C., on May 20, 1976, and supplemented by letter dated June 9, 1976

COMMENT

We believe that it would be counter-productive to limit U. S. standards to those embodied in the 1973 Convention. Such a policy may result in the sacrifice of our own environment and perhaps the world environment for the sake of an international agreement which may never be generally adopted. We reach this conclusion for two reasons:

(1) It does not appear likely that the 1973 Convention will enter into force in the near future. Because of the costly requirements for reception facilities for oily residues and oily mixtures it may never come into force.

(2) There are a number of areas in which there has been neither international discussion or international agreement. Progressive action by the United States in such areas would not undermine the chances of the 1973 Convention being adopted or new agreements being reached. One area where such action could be taken is to establish standards for maneuverability or stopping ability. The Coast Guard need not be bound by the four corners of the 1973 Convention, but should establish where appropriate additional standards to deal with the whole range of risks associated with the marine transportation of oil. Such action can and should be taken in areas such as tanker maneuvering and stopping ability.

RESPONSE

The Coast Guard agrees that legally the measures taken by the U. S. toward reduction of marine pollution from vessels need not be limited to provisions of the 1973 Marine Pollution Convention. However, the Coast Guard is convinced that the Convention represents the best opportunity of achieving the objectives of reducing operational and accidental vessel pollution in the foreseeable future and is, therefore, deserving of strongest U. S. support. Any U. S. actions contemplated must be consistent with these goals.

The 1973 Convention represents a major commitment on the part of the world's nations, and it should be no surprise that so broad and complex a document requires considerable time for nations to implement. Also, delay can be attributed to the ongoing law of the sea negotiations. There are no insurmountable technical problems with implementing the required annexes. As the commenter points out, requirements for reception facilities are costly. For this reason, the Coast Guard is drafting proposed regulations to require that vessels have the necessary equipment to consolidate waste oils, since this will ease the reception facility burden.

The commenter also suggests that issues such as maneuvering and stopping ability of vessels where no international agreement or even extensive discussions have occurred are areas where the U. S. can take action to establish standards without undermining the chances of adoption of the 1973 Convention. The problems associated with establishing these types of performance standards are fully discussed on pages 64-69 and 179-181 of reference (1).

COMMENT

The rules fall short of what might be achieved because they contain no provision for enforcing violations of discharge standards outside U. S. territorial waters against foreign flag vessels.

(CLSP, page 6)

The environmental groups believe that discharge standards may be enforced against foreign flag vessels consistent with domestic and existing international law, as well as emerging international law.

The discharge standards in the proposed rules are international standards, derived from the 1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, and the 1973 IMCO Convention.

The issue, then, is U. S. enforcement of generally accepted international standards, rather than the application of U. S. standards to foreign vessels. If the proposed action is limited to enforcement of international standards, any contention that such action represents a unilateral extension of standard setting jurisdiction is unfounded.

(CLSP, Pages 7-8)

RESPONSE

The Coast Guard cannot agree that the operational discharge standards in the proposed rules are international standards. Rather these standards are proposed international standards not yet in force which will supersede certain provisions of the present international law to which the U. S. is a party, the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended in 1962. The proposed standards as embodied in the 1969 amendments to the 1954 Convention are fairly close to having received sufficient ratifications for entry in force. Many nations have already implemented the standards for

their own vessels as has the United States. Thus, the 1969 amendments have received a measure of acceptance, but they are not yet international law, nor can they be until they enter into force and succeed provisions of the 1954 Convention.

COMMENT

It is clear that the United States does have the power under existing domestic and international law to enforce discharge criteria against foreign flag vessels when violations of such criteria occur outside the territorial jurisdiction of the United States.

The Ports and Waterways Safety Act authorized such exercise of jurisdiction. The Act gives the Coast Guard authority to establish rules and regulations for the operation of all vessels which enter U. S. navigable waters (Section 201(1)). Such jurisdiction does not depend on where the violation occurs. Jurisdiction attaches when the vessel enters U. S. navigable waters. Section 201 (13) of the Act gives the Coast Guard authority to exclude "non-complying" vessels from U. S. navigable waters. Exercise of this authority is fully consistent with the United States' absolute right under international law to exclude vessels of foreign registry from its internal waters. Thus, the United States can exclude foreign vessels from its ports for discharges which occur outside of the territorial jurisdiction of the United States.

The concept of port state enforcement of international discharge standards, if not already part of the international law, certainly represents the emerging consensus. This principle, supported by the U. S., is specifically reflected in the revised Single Negotiating Text at the Law of the Sea Conference (Revised Single Negotiating Text, Part III, Article 28, A/Conf. 62/WP.8/.1/Part III, May 6, 1976). For the United States to step out in front by actually putting such a port state scheme into effect would not only have a beneficial effect in terms of pollution control but would perhaps hasten the general acceptance of port state enforcement.

RESPONSE

This comment recommends that the proposed discharge standards be enforced against foreign flag vessels on international waters and that violators of these standards be denied entry to U. S. ports. A distinction is drawn between the U. S. unilaterally enforcing U. S. standards in international waters and enforcing "generally accepted international standards" on international waters. The contention is that the latter, if not part of international law, represents the emerging consensus, citing Part III, Article 28 of the Revised Single Negotiating Text (Third Conference of Law of the S a, A/Conf.62/WP.8/.1/Part III (May 6, 1976)).

Article 28 can have very little impact on the Coast Guard's resolution of the issues raised by the commenter. As the President of the Conference states in his Note, the Revised Single Negotiating Text "represent(s) a further stage in the work of the Conference." The texts "have no other status than that of serving as a basis for continued negotiation without prejudice to the right of any delegation to move any amendment or to introduce any new proposals. The texts must not be regarded as committing any delegation or delegations to any of their provisions." Article 28, therefore, at this stage of the negotiations of the Convention, binds no one and does not represent a consensus.

More pertinent to the Coast Guard's resolution of this issue is the method employed in Article 4 of the International Conference on Marine Pollution 1973. It reads as follows:

ARTICLE 4

Violation

(1) Any violation of the requirements of the present Convention shall be prohibited and sanctions shall be established therefor under the law of the Administration of the ship concerned wherever the violation occurs. If the Administration is informed of such a violation and is satisfied that sufficient evidence is available to enable proceedings to be brought in respect of the alleged violation, it shall cause such proceedings to be taken as soon as possible, in accordance with its law.

(2) Any violation of the requirements of the present Convention within the jurisdiction of any Party to the Convention shall be prohibited and sanctions shall be established therefor under the law of that Party. Whenever such a violation occurs, that Party shall either:

(a) cause proceedings to be taken in accordance with its law; or

(b) furnish to the Administration of the ship such information and evidence as may be in its possession that a violation has occurred.

(3) When information or evidence with respect to any violation of the present Convention by a ship is furnished to the Administration of that ship, the Administration shall promptly inform the Party which has furnished the information or evidence, and the Organization, of the action taken.

(4) The penalties specified under the law of a Party pursuant to the present Article shall be adequate in severity to discourage violations of the present Convention and shall be equally severe irrespective of where the violations occur.

Article 4 conforms to established international law. It is a principle that can be read in other recent international conventions, such as Article 2 of the United Nations "Convention of The High Seas," 13 UST 2312, TIAS 5200, 450 UNTS 82. Article 2 states that:

"The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty. Freedom of the high seas is exercised under the conditions laid down by these articles and by the other rules of international law. It comprises, inter alia, both for coastal and noncoastal states:

(1) Freedom of navigation;

(2) Freedom of fishing;

(3) Freedom to lay submarine cables and pipelines;

(4) Freedom to fly over the high seas.

These freedoms, and others which are recognized by the general principles of international law, shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas."

It is a principle recognized by the Supreme Court in United States v. Louisiana, et al (363 US 1, 33) "the high seas, as distinguished from inland waters, are generally conceded by modern nations to be subject to the exclusive sovereignty of no single nation."

This concept is expressed as follows in "The International Law of the Sea" by C. John Colombia (6th edition):

"§80. Right of regulation by the community of nations.

"It results from the above considerations that the high sea cannot be under the sovereignty of any State and that no State has a right to exercise jurisdiction over it. The sea must remain common to all nations in order to fulfill its main mission of an international highway. It does not follow, however, that because no jurisdiction is enjoyed by any State on the high seas, that the community of nations is not entitled to provide, by international agreement, binding rules on the proper use of the sea to the greatest possible advantage of all States and also for the purpose of establishing a legal order in and over it. If this were not so, a state of anarchy and lawlessness would prevail on the open seas, not only rendering its use incapable of proper exploitation, but endangering the lives and property of persons sailing in it.

A right to regulate the open seas must therefore be recognized to the international community of nations . . . ."

It is the Coast Guard's opinion that this is a well established principle of international law, and the commenter's recommendation, since it ignores this principle, cannot be accepted.

COMMENT

There was a general recognition at the 1973 International Conference on Marine Pollution that port state enforcement might be appropriate to ensure compliance with standards negotiated at that Conference. Thus, it is likely United States action under the Ports and Waterways Safety Act would not be viewed by the international community as an unwarranted and unexpected assertion of unilateral jurisdiction.

RESPONSE

It is not clear at all that "there was a general recognition at the 1973 International Conference on Marine Pollution that port state enforcement might be appropriate to ensure compliance with standards negotiated at that Conference," and even if there was, might be is considerably short of is. This impression of the consensus of the Conference is at variance with that reported by Pearson[1]:

"The 1973 London Conference on the Prevention of Pollution by Ships presents a vivid illustration of the intrusion of other ocean issues in forming marine environment policy. Two

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[1]Pearson, Charles S., International Marine Environment Policy: the economic dimension, Baltimore, Maryland, 1975.

questions that lie at the core of most ocean issues were raised and nearly succeeded in sinking the conference. Both concerned jurisdiction -- the areal extent of national jurisdiction over ocean space, and the rights of coastal states to establish more stringent environmental measures for the protection of their environment within areas under their jurisdiction.

"With regard to the areal extent of jurisdiction, which directly involves most important law-of-the-sea issues, the question at London was the extent to which a country could extend its environmental jurisdictional zone. Ultimately, the question was side-stepped. The convention obliges a country to prohibit and punish violations 'within its jurisdiction, or to refer them to the flag state for prosecution.' It intentionally avoided any resolution of the areal jurisdictional question and, in line with the U. S. position, deferred the matter to the forthcoming Law of the Sea Conference. Thus there was no endorsement or condemnation of the asymmetrical situation in which Canada claims a 100 mile environmental zone and the United States 12 miles.

"The conference also avoided a resolution of the rights of coastal states to establish more stringent measures within their ocean jurisdiction. Presumably, these measures would include rigorous ship discharge standards and specifications regarding ship design and pollution control equipment. The United States, as a major maritime power with a strong interest in unimpeded commercial navigation, wishes to see internationally uniform environmental controls over marine transit, rather than a patchwork of differing coastal state standards. Article 8 of the draft convention, prepared prior to the conference, explicitly permitted states to establish more stringent standards under certain conditions. This article became the most controversial element at the conference and, following considerable pressure by the United States, was omitted from the final document, the question being deferred to the Law of the Sea Conference. (As described by Russell Train, Chairman of the U. S. Delegation, 'This really was the most difficult element in the Conference because it involved such divergent points of view <u>not really of an environmental nature</u>, or even a maritime nature, but of national interest generally.'" <u>Hearings on the 1973 IMCO Conference</u>, p. 9 (emphasis added by Pearson).

The issue of coastal or port state enforcement thus was not resolved at the Conference, and as indicated in the response to an earlier comment, has not yet been resolved at the Law of the Sea Conference. Likewise, other comments received on the draft statement demonstrate that the statement, "it is likely that United States action under the Ports and Waterways Safety Act would not be viewed by the international community as an unwarranted and unexpected assertion of unilateral jurisdiction" is in error. (See pages 93, 97, 103 and 112).

COMMENT

The three reasons given by the Coast Guard in the draft EIS as mitigating failure to impose discharge standards on foreign vessels are unpersuasive.

The mere fact that a vessel must be equipped to practice LOT does not ensure that discharges will be within acceptable limits. In many situations there will be a temptation to discharge in violation of international standards, regardless of the equipment required to be installed.

The fact that many flag states are requiring their vessels to comply with the 1969 Amendments scarcely begins to solve the problem of operational pollution. Flag state enforcement must be supplemented by other enforcement mechanisms if there is going to be any assurance that discharge criteria are not going to be violated with impunity.

The mere escalation in the value of oil is far from sufficient to deter willful violations of international standards. Although the cost of oil has escalated dramatically in the past two years, there is no proof that operational discharges have been reduced. The United States cannot rely on external forces to influence others to reduce their operational discharges; it must take action itself if it wishes to assure adequate protection for the marine environment.

RESPONSE

The Coast Guard agrees that "the mere fact that a vessel must be equipped to practice LOT does not ensure that discharges will be within acceptable limits." Making the discharge standards applicable to foreign vessels outside U. S. waters or any other action within the practical limits of the Coast Guard's power would not ensure that either. The question is, rather, what can the Coast Guard do, within the practical limits of its authority and the resources available to it, to encourage the greatest reduction in operational discharges by the most dischargers. In this regard, the Coast Guard believes the principle applies which states, "If it is as easy to do the right thing as it is to do the wrong thing, then most people will do the right thing."

The Coast Guard believes the requirement by many nations that their vessels comply with the discharge criteria in the 1969 Amendments will be of benefit in reducing operational pollution. International mechanisms already exist for referral of violations to flag state for prosecution.

The Coast Guard also believes the increasing value of oil does provide strong incentive for operational discharge reduction, and that there is considerable potential for increasing such incentives through already beginning to be included clauses in charter party agreements and the like.

It is true, of course, that no proof of reduced operational pollution resulting from higher oil prices can be demonstrated, but such lack of proof does not refute the basic economic principle that

when the value of a pollutant exceeds the cost of its recovery, it is no longer regarded as a pollutant but as an asset.

State of New Jersey
DEPARTMENT OF COMMUNITY AFFAIRS

PATRICIA Q. SHEEHAN
COMMISSIONER

363 WEST STATE STREET
POST OFFICE BOX 2768
TRENTON, N.J. 08625

May 20, 1976

MARINE SAFETY COUNCIL
STAFF
RECEIVED
MAY 26 1976
pmo

Executive Secretary
Marine Safety Council
U. S. Coast Guard (G-CMC/81)
Washington, D.C. 20590

RE: OSRC-FY-76-875

Dear Mr. Secretary:

This will acknowledge receipt of your recent Project Notification for the Draft Environmental Impact Statement - Regulations for U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States. The project has been designated application OSRC-FY-76-875 for all future references.

We have circulated this Project Notification to the appropriate State agencies for review and comment. We anticipate no problems during the review phase, but should any conflicts or issues arise, it will be necessary to schedule a conference in order to resolve the issues prior to the issuance of a Letter of Certification.

Very truly yours,

Jerry Eure

Jerry Eure
Supervising Planner
Project Review Section
Division of State and
Regional Planning

JE:br

State of New Jersey
DEPARTMENT OF COMMUNITY AFFAIRS

PATRICIA Q. SHEEHAN
COMMISSIONER

363 WEST STATE STREET
POST OFFICE BOX 2768
TRENTON, N.J. 08625

June 15, 1976

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 22 1976

Executive Secretary
Marine Safety Council
U.S. Coast Guard (G-CMC/81)
Washington, D.C. 20590

RE: OSRC-FY-76-875

Dear Mr. Secretary:

In accordance with the U.S. Office of Management and Budget Circular A-95 Revised, your Environmental Impact Statement for the Draft E.I.S. - Regulations for U.S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that Enter the Navigable Waters of the United States designated application OSRC-FY-76-875 has met the State of New Jersey's Clearinghouse regulations.

We have circulated this Project Notification to the appropriate State agencies, none of which have voiced any objections.

Very truly yours,

Sidney L. Willis
State Review Coordinator

SLW:br

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

TRENTON 08625

OFFICE OF THE COMMISSIONER

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUL 07 1976

30 June 1976

Executive Secretary
Marine Safety Council
U. S. Coast Guard (G-CMC/81)
Washington, DC 20590

Dear Sir:

This is in response to the Draft Environmental Impact Statement for Regulations for U. S. Tank Vessels Carrying Oil in Foreign Trade and Foreign Tank Vessels that enter the Navigable Waters off the United States. This office has reviewed the aforementioned document and has no substantive comments to make at this time. However, we are submitting a copy of the EIS to our Department's Division of Water Resources, Office of Special Services for their review. If applicable, they may comment on the Draft EIS within the near future.

Thank you for the opportunity to review the Draft EIS.

Sincerely yours,

Lawrence Schmidt, Chief
Office of Environmental Review

LS:mm

Response to comments by New Jersey contained in letters dated 20 May, 15 June and 30 June 1976

RESPONSE

The three letters from New Jersey state officials demonstrate wide circulation of the DEIS within the state. The letters contain no substantive objection or comment to the proposed action. No response necessary.

FROM SHELL INTERNATIONAL MARINE LTD LONDON MRS (MRA MRP MRI MR) ""
TX 919651
URGENT TO ADMIRAL O.W. SILER, U.S. COAST GUARD, WASHINGTON

CORRECTED ROUTING
DESTROY PREVIOUS CO

REF LON196435 11/JUNE/76

PROPOSED RULE MAKING REF. 33 CFR PART 157

SHELL GROUPS OF COMPANIES TOGETHER OWN/OPERATE OVER 130 OIL TANKERS TOTALLING OVER 14 MILLION TONS DEADWEIGHT AND SHELL INTERNATIONAL MARINE LIMITED ADDITIONALLY HAS ON CHARTER AT ANY ONE TIME TYPICALLY A SIMILAR NUMBER OF INDEPENDENTLY OWNED TANKSHIPS TOTALLING OVER 15 MILLION TONS DEADWEIGHT. THESE SHIPS OF MANY FLAGS TRADE WORLDWIDE AND TO THE UNITED STATES. SHELL INTERNATIONAL THEREFORE ARE LIKELY TO BE OPERATIONALLY AFFECTED
(CONTINUED)

19643S/2
BY ANY U.S. LEGISLATIVE REQUIREMENTS RELATING TO NON-U.S. FLAG TANKERS WHEN IN U.S. WATERS OR PORTS.
DESPITE THIS LONG TIME INVOLVEMENT IN TRADING TO THE UNITED STATES WE HAVE NOT TAKEN OPPORTUNITY OF DIRECT COMMENT ON PAST PROPOSED RULEMAKING BUT WOULD NOW WISH TO DO SO IN RESPECT OF 33 CFR PART 157 AS NOTIFIED IN SPECIFIC DETAIL IN THE FEDERAL REGISTER OF 15 APRIL 76 FOR NEW SHIPS AND AS GIVEN AS ADVANCE NOTICE IN FEDERAL REGISTER OF 13 MAY 76 IN RESPECT OF EXISTING TANKSHIPS.
WE FEEL CONSTRAINED TO MAKE THESE COMMENTS BECAUSE CERTAIN ASPECTS OF THIS PROPOSED RULE MAKING ARE QUITE UNPRECEDENTED IN THE EXTENT OF THEIR UNILATERAL CONSTRUCTIONAL REQUIREMENTS AND WOULD, WE BELIEVE, BE FAR REACHING IN THEIR EFFECT ON PRESENT INTER-GOVERNMENTAL ARRANGEMENTS FOR THE CONTROL OF SHIPPING IF THEY WERE TO BE BROUGHT INTO EFFECT. WE BELIEVE ALSO THAT THESE PARTICULAR REQUIREMENTS WOULD REPRESENT A MOST COSTLY BUT COMPARATIVELY INEFFECTIVE CONTRIBUTION BY THE U.S. TO THE MINIMISATION OF TANKER SOURCE POLLUTION.
(CONTINUED)

196435/3
SHELL, THROUGH ITS CONNECTIONS WITH THE INTERNATIONAL CHAMBER OF SHIPPING AND ITS MEMBERSHIP OF THE OIL COMPANIES INTERNATIONAL MARINE FORUM HAS ALWAYS SUPPORTED THE TIMELY FORMULATION OF AGREED INTERNATIONAL REGULATIONS FOLLOWED BY THEIR SPEEDIEST AND MOST WIDESPREAD IMPLEMENTATION AND ENFORCEMENT.
WHILST MULTILATERAL IMPLEMENTATION RELATED TO INTERNATIONAL RATIFICATION IS THE IDEAL, WE WELL APPRECIATE THE FRUSTRATION ENGENDERED BY THE OFTEN TARDINESS OF INTERNATIONAL CONVENTION RATIFICATION PROCEDURE. FOR THESE REASONS WE DO NOT DEPRECATE THOSE ITEMS IN THE PROPOSED RULEMAKING WHICH WOULD IMPLEMENT VARIOUS REQUIREMENTS OF THE 1973 CONVENTION.
NEVERTHELESS WE SHOULD POINT OUT THAT THE APPLICATION OF CLAUSE 157.11(A)(2) IN RESPECT OF ABOVE WATER DISCHARGING AND OF 157.37(A)(6) TO EXISTING SHIPS MAY, BECAUSE OF THE HIGH COST OF MODIFICATION, ELIMINATE MANY OLDER THOUGH EFFICIENT SHIPS FROM ELIGIBILITY FOR U.S. TRADE AND, BY REDUCING THE TONNAGE AVAILABILITY, THEREBY ADD TO THE MARKET PRESSURES OUTLINED IN CCC) BELOW.
(CONTINUED)

196435/4
WE DO, HOWEVER, STRONGLY DEPRECATE THE ARBITRARY AND UNILATERAL PROPOSALS OF CLAUSE 157.09 WHICH FOR LARGE NEW SHIPS OF ANY FLAG IN U.S. WATERS WOULD IMPOSE LOWER MAXIMUM HYPOTHETICAL ACCIDENTAL OIL OUTFLOW THAN DO IMCO REQUIREMENTS AND WOULD REQUIRE A FORM OF DISTRIBUTION OF SEGREGATED BALLAST WHICH HAS NOT BEEN SUBJECT TO ANY INTERNATIONAL INVESTIGATION OR DEVELOPMENT.
WE ALSO MUST STRONGLY DEPRECATE THE MORE RECENT PROPOSAL TO REQUIRE SOME FORM OF SEGREGATED BALLAST OPERATION ON EXISTING LARGE TANKERS OF NON-U.S. FLAG VISITING U.S. WATERS.
BEFORE YOU PROCEED WITH THESE PROPOSALS WE THINK YOU SHOULD CONSIDER THE FOLLOWING:
AAA) THE REDUCTION TO 80 PERCENT OF CONVENTION OUTFLOW QUANTITIES AND THE RULES FOR DISPOSITION OF SEGREGATED BALLAST BEAR VERY DIRECTLY ON SHIP STRUCTURAL DESIGN. THE PRESENT ECONOMY AND CONTINGENCY CAPABILITY OF OIL TRANSPORTATION IS BUILT UPON WORLDWIDE FLEXIBILITY OF ROUTING AND USAGE OF TANKERS. IF OTHER COUNTRIES SHOULD FOLLOW THE
(CONTINUED)

196435/5

U.S. PRECEDENT AND FORMULATE THEIR OWN ARBITRARY CONSTRUCTION RULES THEN THE WHOLE PRESENT FRAMEWORK OF OCEAN OIL TRANSPORTATION COULD BE DISRUPTED AND COULD DESCEND TO VERY COSTLY CHAOS INDEED.

BBB) THE SITUATION DESCRIBED UNDER AAA) IS THE ABNEGATION OF ALL THAT IS SENSIBLE AND PURPOSEFUL IN THE IMCO MECHANISM OF INTERNATIONALLY AGREED AND MULTILATERALLY IMPLEMENTED REQUIREMENTS AND IT SEEMS TO US THAT IF SUCH A POWERFUL LEADING NATION AS THE UNITED STATES DOES ENACT AND ENFORCE UNILATERAL LEGISLATION OF THIS ARBITRARY AND ONEROUS CONSTRUCTIONAL NATURE THEN THE CREDIBILITY AND CONTINUED VIABILITY OF IMCO COULD VANISH OVERNIGHT.

CCC) LOOKING MORE SPECIFICALLY AT THE EFFECT OF REQUIRING SEGREGATED BALLAST (SBT) IN EXISTING TANKERS OF OVER 70,000 DWT ESTIMATES SUGGEST THAT BY THE MID-EIGHTIES SOME HALF OF CRUDE OIL IMPORTS MAY BE CARRIED INTO U.S. TERRITORIAL WATERS BY SHIPS IN EXCESS OF 70,000 DWT INVOLVING THE USE OF BETWEEN 100 AND 150 SUCH

(CONTINUED)

196435/6

SHIPS AT ANY ONE TIME. IF THESE SHIPS WERE REQUIRED TO BE SBT THEN THEIR BASIC FREIGHT RATE MUST INCREASE BY SOME 20 PERCENT ABOVE THEIR NON-SBT EQUIVALENT. HOWEVER, IT IS UNLIKELY THAT A GREAT EXCESS OF SHIPS WOULD BE CONVERTED TO SBT FOR THE U.S. TRADE AND THE NORMAL VERY WIDE AVAILABILITY AND FLEXIBILITY IN PROGRAMMING SHIPS FOR THIS TRADE WOULD BE GREATLY REDUCED. EXPERIENCE SHOWS THAT IN SUCH CONDITIONS MARKET FORCES WOULD NORMALLY GENERATE A PREMIUM WHICH WOULD BE IN EXCESS OF THE BASIC FREIGHT COST INCREASE. ALTERNATIVELY IT MAY BE THAT IN ORDER TO LIMIT CONVERSION TO SBT THE TRADE WOULD MOVE TOWARDS INCREASED TRANSHIPMENT AND FINAL DELIVERY THROUGH U.S. WATERS IN SHIPS OF LESS THAN 70,000 DWT. AGAIN SUBSTANTIALLY HIGHER COSTS THAN DIRECT NON-SBT DELIVERY WOULD BE INVOLVED AS WOULD BE AN INCREASE IN TRAFFIC DENSITY AT RECEIVING PORTS AND AN INCREASE IN TOTAL NUMBER OF OIL TRANSFERS.

DDD) IT IS OFTEN SAID THAT RETROFITTED SBT IS NO MORE THAN AN ACCELERATION OF PROGRESS TO AN ERA WHICH HAS ALREADY BEEN

(CONTINUED)

196435/7
AGREED FOR THE FUTURE VIA NEWBUILDINGS. SUCH A STATEMENT NEEDS SOME RESERVATION SINCE THE COSTS AND USE OF RESOURCES IN RETROFITTED SBT ARE OF A WHOLLY DIFFERENT NATURE FROM THOSE ATTACHING TO NEWBUILDING SBT. FOR THE LATTER THE ONLY COST AND RESOURCE USAGE IS THE EXTRA CONSTRUCTIONAL STEEL TO PROVIDE FOR THE EXTRA CUBIC CAPACITY FOR BALLAST. IN THE CASE OF RETROFITTED SBT, CONVERSION COSTS ARE HIGH AND VARIABLE, MORE SHIPS MUST BE USED TO TRANSPORT THE SAME AMOUNT OF OIL AND AS A CONSEQUENCE OVERALL FREIGHT COSTS ARE ESCALATED MUCH MORE THAN FOR NEWBUILDING SBT, CONSIDERABLY MORE STEEL IS USED IN PROVIDING EXTRA SHIPS AND PROPORTIONATELY MORE BUNKERS USED IN PROPELLING THESE EXTRA SHIPS.

EEE) THE VIRTUES OF SBT ARE INDEED REAL IN THAT IT REDUCES THE REQUIREMENT FOR TANK CLEANING ON THE BALLAST VOYAGE AND ELIMINATES THE WORRY IN THE DISCHARGE OF CLEAN BALLAST FROM CARGO TANKS AT THE LOADING PORT. FOR THESE REASONS SBT AS ACHIEVED ON NEWBUILDINGS AT REASONABLE AND WORLDWIDE SHARED

(CONTINUED)

196435/8
COSTS AND WITHOUT TRADE DISRUPTION IS SENSIBLE. SBT APPLIED TO EXISTING FOREIGN FLAG SHIPS VISITING U.S. WATERS DOES, HOWEVER, INVOLVE GREAT ALTRUISM IN THAT WHILST THE COSTS MUST INEVITABLY FALL UPON THE U.S. AS THE CALLER OF THE TUNE, THE MARGINAL REDUCTION IN POLLUTION WILL NOT AFFECT U.S. WATERS BUT ONLY FAR AWAY LOADING PORTS AND THE HIGH SEAS WELL AWAY FROM U.S. SHORES. INDEED IF THESE REGULATIONS WERE TO INCREASE THE AMOUNT OF TRANSHIPMENT INTO SMALLER SHIPS FOR FINAL DELIVERY, THIS COULD BE COUNTER-PRODUCTIVE BECAUSE OF THE INCREASE IN TANK WASHING ON COMPARATIVELY SHORT BALLAST VOYAGES CLOSE TO U.S. SHORES.

WHILST THE ABOVE COMMENTARY ON THESE PARTICULAR ASPECTS IS WHOLLY OF A NEGATIVE NATURE, WE IN SHELL INTERNATIONAL MARINE HAVE, AS YOU DO, AN ABHORRENCE OF THE PRESENT LEVEL OF POLLUTION FROM TANKERS. WE DO BELIEVE, HOWEVER, THAT MUCH MORE CAN BE DONE TOWARDS ELIMINATION OF THIS POLLUTION BY MUCH SIMPLER, LESS DRASTIC ENDEAVOUR THAN THAT WHICH YOU ARE PROPOSING.

(CONTINUED)

19643579
WE HAVE PARTICULARLY IN MIND FIRSTLY THE WIDE IMPLEMENTATION OF THE 1969 AMENDMENTS AND THEIR DETERMINED ENFORCEMENT. IN THIS LATTER RESPECT, CO-OPERATION FROM OIL PRODUCING STATES AND FROM FLAG STATES IN THE WIDESPREAD USE OF LOADING PORT INSPECTIONS WOULD BE OF ENORMOUS VALUE. SECONDLY THE RECENTLY LAUNCHED ICS POLLUTION PREVENTION CODE (OIL TANKERS), TO WHICH WITH OTHERS WER ARE SIGNATORIES, HAS, WE BELIEVE, VERY SUBSTANTIAL POTENTIAL AND A FEW DAYS AGO WAS APPROVED BY IMCOS MEPC. SUPPORT AND ENCOURAGEMENT OF THE CODE BY GOVERNMENTS WOULD HELP IT MORE SPEEDILY ACHIEVE ITS OBJECTIVES.
FINALLY WE NEED HARDLY STRESS THAT WE DO REGA
25#3 .-5534 91
THIS TELEX TO BE OF VITAL IMPORTANCE BOTH TO THE TANKER INDUSTRY AND TO THE OIL CONSUMER. SHOULD THERE BE ANY AREA OF UNCERTAINTY IN WHAT IS HERE SAID OR OTHERWISE AND ON WHICH WE COULD BE OF FURTHER HELP WE WOULD BE PLEASED, SHOULD YOU WISH IT, TO VISIT YOU AND DISCUSS IT.

NNNN

Response to comments submitted by
Shell International Marine Ltd. in
11 June 1976 telex

COMMENT

We should point out that the application of clause 157.11(a)(2) requiring above-water discharging and 157.37(a)(6) to existing ships may, because of the high cost of modification, eliminate many older though efficient ships from eligibility for U. S. trade and, by reducing the tonnage availability, thereby add to the market pressures outlined in (C) below.

RESPONSE

Several commenters suggested that the requirements for rerouting piping systems be eliminated in proposed 157.11 because the rearrangements will not in themselves effect a significant reduction in oil discharge during normal tanker operations and is unjustified on grounds of cost-effectiveness, especially in older vessels. Before making the proposal, the Coast Guard studied this issue and determined that the proposed resolution is technically and economically feasible. Section 157.11 requires the fixed piping system to discharge to the sea from above the weather deck or the side above the waterline of the deepest ballast condition. Pumps capable of pumping cargo to deck level and then ashore are capable of pumping oily mixtures over the side as required without rearrangement. Accordingly, the Coast Guard did not accept this suggestion.

COMMENT

We strongly deprecate the arbitrary and unilateral proposals of clause 157.09 which for large new ships of any flag in U. S. waters would impose lower maximum hypothetical accidental oil outflow than do IMCO requirements and would require a form of distribution of segregated ballast which has not been subject to any international investigation or development. Before you proceed with these proposals we think you should consider the following:

A. The reduction to 80% of Convention outflow quantities and the rules for disposition of segregated ballast bear very directly on ship structural design. The present economy and contingency capability of oil transportation is built upon worldwide flexibility of routing and usage of tankers. If other countries should follow the U. S. precedent and formulate their own arbitrary construction rules then the whole present framework of ocean oil transportation could be disrupted and could descend to very costly chaos indeed.

B. The situation described under A. is the abnegation of all that is sensible and purposeful in the IMCO mechanism of internationally agreed and multilaterally implemented requirements and it seems to us that if such a powerful leading nation as the United States does enact and enforce unilateral legislation of this arbitrary and onerous constructional nature then the credibility and continued via viability of IMCO could vanish overnight.

RESPONSE

This is but one of several comments criticizing the proposed requirements as attempting to introduce unilaterally, for foreign-flag vessels, detailed requirements that exceed internationally-agreed standards. A commenter suggested that it could be counter productive to the objective of pollution avoidance to specify, at this stage, the distribution of the segregated ballast. He also suggested that it is unreasonable to specify a 20% reduction in the maximum hypothetical outflow specified in the 1973 Convention.

The 1973 Convention only requires meeting its standards. It does not prohibit more stringent standards, especially on issues for which no specifications are supplied. The distribution of segregated ballast spaces is considered by the Coast Guard as a logical and beneficial corollary to a segregated ballast capacity on new vessels. Since the issue in the comment was centered in the Coast Guard's co-called "unilateral actions" and not on the technical merits of the distribution of segregated ballast, it is considered an issue that is dealt with by the preamble in the April 15, 1976 notice of proposed rule making, and is not accepted by the Coast Guard.

One of those commenters also criticized the ballast location proposal because "it appears to be of secondary value and to have been considered in relation to only a limited number of possible tanker designs or alternative measures." This commenter appears to have misunderstood the objective of the regulations, as stated in the preamble in the October 14, 1975 issue of the Federal Register. The primary purpose (or value) of these regulations is to protect the marine environment by reducing operational pollution. A secondary purpose (or value) of these regulations is, with the proper positioning of segregated ballast, to achieve a significant measure of additional protection, as a result of the extra cubic capacity that such ballast provides, over a range of accident circumstances. The study Group Report, of April 28, 1975, has been included in the Final Environmental Impact Statement on Regulations for Tank Vessels

Engaged in the Carriage of Oil in Domestic Trade. The study states the following:

> "This study was necessarily carried out within a limited time frame. Every effort was made to include all of the creative thinking and analysis work that various industry and government groups had already developed on this subject. The study group expressed a good deal of its own creative ability but the possibility remains that there are other design concepts which might exist and be found advantageous. The time limitations also forced the study group to do most of its evaluation on designs in the 120-250,000 DWT size range with lesser attention to ships up to 500,000 DWT. Different design alternatives might be more or less advantageous on ships which fall outside the 120-250,000 DWT size range. The study group also necessarily focused its attention on designs with conventional ratios of length to beam to depth. The same problems may apply with designs which are not conventional in this regard. The study group also recognizes that a correction factor to the formula may be necessary for ship sizes larger than those primarily studied. Time limitations again precluded particular consideration of this item. There is almost no quantitative data available which relates resulting internal structural integrity to the depth of accidental penetration. The study group used the same approach as in the IMCO hypothetical outflow regulation in regard to the point of penetration. <u>While this is a simplified assumption, it should provide a relative measure of effectiveness for differing designs in accident circumstances</u>." (Underscoring supplied).

Since the purpose of the study was to provide the measure, the Coast Guard considers that the study was worthwhile and has met its objectives. If new vessels are not built in the near future, no vessels will be affected by the requirements while IMCO is considering the issue. The rules could, of course, be changed in the future depending upon positive IMCO action.

MPERIAL OIL LIMITED

111 ST CLAIR AVENUE WEST TORONTO CANADA M5W 1K3

TRANSPORTATION DEPARTMENT
MARINE DIVISION

W. H. ABEL, MANAGER

June 9, 1976

File: 0810

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 15 1976

Notice CGD 75-240
Fed. Reg. Issue
15 April 1976

Executive Secretary,
Marine Safety Council,
U.S. Coast Guard H.Q.,
Washington, D. C. 20590

Dear Sir:

We take note of proposed amendments to Part 157 of Coast Guard Rules detailed in the above notice.

These proposals deal with questions which are within the competence of the Marine Environment Protection Committee of IMCO. It is, therefore, inappropriate for the U.S. to issue such a regulation affecting foreign ships until it has been discussed and endorsed by that body. Article 16 of IMCO 73 provides the machinery for doing this. To attempt to circumvent this procedure by so large and influential a party as the U.S. A. can only bring the whole question of international law related to shipping into jeopardy.

CGD 75-240 in its present form should be withdrawn. If U.S.C.G. believes strongly in it, it should be submitted for consideration by the Marine Environment Protection Committee of IMCO through the designated channels. The course proposed is a discourtesy to IMCO.

We also endorse the opinion of the French delegation to the recent IMCO meeting that the result would be in conflict with international law when the 1973 Convention enters into force. The U.S. reply failed to take note of the fact that they signed IMCO 73 and, therefore, solemnly accept its provisions. Articles 5,7,15 and 16 of IMCO 73 are pertinent to the above issue.

Yours very truly,

E. E. Bustard

cc. Mr. W. O. Gray, Exxon Corporation

Response to Comments submitted by
Imperial Oil Limited in a letter
dated June 9, 1976

COMMENT

These proposals deal with questions which are within the competence of the Marine Environment Protection Committee of IMCO. It is, therefore, inappropriate for the U. S. to issue such a regulation affecting foreign ships until it has been discussed and endorsed by that body. Article 16 of IMCO 73 provides the machinery for doing this. To attempt to circumvent this procedure by so large and influential a party as the U.S.A. can only bring the whole question of international law related to shipping into jeopardy. The proposed rules should be withdrawn and submitted for consideration by the Marine Environment Protection Committee of IMCO through the designated channels. The course proposed is a discourtesy to IMCO.

RESPONSE

The International Conference on Marine Pollution 1973 already has dealt with all the provisions of the proposed rules excepting that portion concerning distribution of required segregated ballast capacity. The amendment procedures of Article 16 of the 1973 Convention cannot be used until that Convention enters into force.

The portion of the rules concerning segregated ballast distribution has been discussed in a prior response on pages 93-95.

Oil Companies I rnatio: Marine Forum

6th Floor
Portland House
Stag Place
London SW1E 5BH
England
Telephone: 01-828 7696
Cables: Ocimfor London SW1
Telex: 24942

MARINE SAFETY COUNCIL
STAFF
RECEIVED

JUN 15 1976

June 9, 1976

Re: Notice (CGD-75-240) "Certain Tank Vessels, Proposed Rules for Carrying Oil" from Federal Register, Vol. 41, No. 74 of April 15, 1976

Executive Secretary
Marine Safety Council
U. S. Coast Guard (G-CMC/81)
Washington, D. C. 20590

Dear Sir:

I am writing on behalf of the Oil Companies International Marine Forum (OCIMF) to acquaint you with its views on the proposed rules published in the April 15, 1976 Federal Register. OCIMF was created six years ago and now has 43 member oil companies from all areas of the Free World. Through its member companies it is believed to represent upwards of 80% of the Free World's oil tanker movements. Perhaps the principal role of OCIMF is to express technical viewpoints on international regulatory matters through our consultative status at IMCO.

Consistent with this role, we would not normally expect to comment on proposed U.S. rule-making. Because of the broad international nature of the April 15 proposals, however, we feel it is essential in this case to acquaint you with the viewpoint of our member companies on these proposals. Rather than make detailed comments on each of the various specific regulatory proposals, we would like to restrict our comments to what we consider the most significant elements. In this regard, we are, of course, aware that the International Chamber of Shipping (ICS) is also providing you with comments reflecting the viewpoints of the international shipping community on a point-by-point basis.

Our analysis of the April 15 notice indicates that the main thrust of the proposed regulations would be unilateral application in the near future of the major provisions of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, insofar as they apply to tankers. It is noted further that the intent of such unilateral action would be to extend these provisions to foreign vessels entering U.S. waters as well as to U.S. Flag tankers. Having participated in all preliminary meetings and at the 1973 IMCO Conference, OCIMF is a strong supporter of the 1973 Convention, and to the extent your present proposals may help to bring this act into force, they have our wholehearted support.

Despite this very positive objective, there is one portion of the regulations with which we strenuously disagree. The proposed Section 157.03, which would be revised to require new foreign tankships over 70,000 DWT entering the navigable waters of

the U.S. to comply with Section 157.09 (d) concerning distribution of segregated ballast spaces clearly exceeds the requirements of the 1973 IMCO Convention and in our view should be withdrawn. We have two reasons for believing this is a very unfortunate proposal. First, as your notice clearly states, it would represent a major unilateral requirement in excess of the provisions adopted through IMCO and, accordingly, it will serve to hamper and frustrate the effectiveness of the international regulations. Second, the ballast location proposal has not been studied internationally. Furthermore, on the basis of the restricted study conducted on this concept in the U.S., it appears to be of secondary value and to have been considered in relation to only a limited number of possible tanker designs or alternative measures. We would like to comment further on each of these two aspects.

The concept of unilateral adoption of design and construction standards for foreign vessels entering any nation's waters was discussed at length at the 1973 IMCO Conference and continues to be discussed at the Law of the Sea Conference. While OCIMF has no particular expertise in the legal aspects of these matters, we would like to refer you back to various statements by U.S. representatives on this very fundamental issue. Two weeks after the 1973 Conference, on November 14, 1973, the leaders of the U.S. delegation testified before the Senate Committee on Commerce to report on the 1973 Conference. Mr. Russell E. Train, leader of the U.S. delegation, made a very positive statement on the 1973 Convention as a whole. A number of his remarks are worth reviewing now.

> "The United States worked throughout that period with the other 78 countries represented in order to achieve a Convention which could be the basis of drastic reduction of the current pollution of the sea both by oil and other noxious substances.
>
> "It is my belief that we have, to a large extent, achieved that goal. I think we can be proud of the fact that the two years of international activity culminating in this Convention followed a U.S. initiative, made in 1970, calling on the nations of the world to take action to end ship-generated marine pollution in this decade."

We believe this statement typifies Mr. Train's testimony and indicates that he sincerely believed the 1973 IMCO Convention achieved the goals set by the U.S. We recognize that elsewhere in his testimony he indicated that the U.S. had supported a position leaving some freedom of unilateral action to individual nations but addressing this subject as really being a matter for determination by international law. In this regard, he evidently believed that some limitations on unilateral acts did or would exist:

> "As I indicated, this was left by the convention (1973 IMCO) to international law. The question is not what this convention, or how this convention affects that right, rather the question is what right exists insofar as international law is concerned.
>
> "Again I do not consider myself really very expert in this area, but I can conceive that certain kinds of restrictions would be so burdensome as to constitute

an unreasonable interference with the freedom of navigation on the high seas. It seems to me, at least arguably, that there may well be some kinds of standards, which if unilaterally applied by the coastal state to the vessels of another nation's flag vessel entering the coast state's waters, could be considered in contravention of international law."

Later in these proceedings, Admiral Chester Bender, then Commandant of Coast Guard who was Vice Chairman of the U.S. delegation in 1973, made the following statement in regard to discussion of a "Draft Article 8"which would have limited the rights of nations to adopt unilateral design and construction standards.

"It was a central article of faith at the Conference--that which you referred to earlier as Article 8, sir,--in abandoning inclusion of an article formally limiting unilateral action, that all nations would act responsibly in substantial conformance with the Convention provisions. Because of the recognition by other nations of the operative thrust of the Ports and Waterways Safety Act, any actions by the United States will be followed with great interest by other governments in formulating their policies with respect to ratification of the Convention and possible measures in response to U.S. unilateral action. If standards are imposed on only U.S. Flag vessels stricter than those standards aopted internationally, serious inequities could arise when U.S. vessels call in U.S. ports alongside foreign vessels engaged in the same trade but not subject to the same regulatory constraints. Furthermore, such an approach would not enhance the protection of the marine environment in any effective way, since the majority of seagoing vessels entering U.S. ports are under foreign flag.

"At this time, it is our hope that we can accept the Convention as being consistent with the interests of the United States, with the implementation of additional vessel operational controls, where necessary, to meet unique environmental demands. Examples of such operational controls are improved traffic management, mandatory use of sufficient tugs, and improved navigation systems."

OCIMF believes that the views expressed by these two gentlemen two and a half years ago sum up very succinctly the hopes of responsible persons in the international marine community for effective and enforceable measures developed through IMCO. We cannot understand why these basic beliefs, agreed at the conclusion of the 1973 Conference, are now about to be abandoned in favor of unilateral action.

Another proposal having similarly profound implications is that appearing in the May 13, 1976 Federal Register concerning the possibility of the U.S. Government requiring retrofitting of segregated ballast to existing foreign tankers over 70,000 DWT entering U.S. waters. This subject was discussed at length at MEPC on May 25 from which we would like to quote paragraph 24 of the draft report.

"Several delegations expressed grave concern over the measures contemplated by the United States insofar as they affect foreign ships. In response, the United States delegation explained to the Committee about the issuance of

an advance notice of proposed rule-making (circulated informally) stating that regulations are under consideration which would require segregated ballast tanks in existing tankers of 70,000 DWT and over. The subject notice is now open for comments by interested parties. The United States delegation promised to keep the Committee informed of any further developments in the matter. The French delegation pointed out that the result might be in conflict with the international law when the 1973 Convention enters into force. The United States delegation emphasized that the Committee is not an appropriate forum to discuss international law nor is it within the competence of the Committee to judge critically the action of a Member State exercising its prerogative under national law."

At one point during discussion of this matter at MEPC, it was stated that unilateral action of the type contemplated in the U.S. by any important nation is clearly contrary to the spirit and objectives of IMCO and could in the final analysis serve only to do away with any hope for effective international maritime regulations.

Finally on this point, we believe that there is a very clear parallel in the contemplated action to that which we understand is now taking place in the U.S. between federal regulations and state regulations. We believe that the case for uniform federal measures as endorsed by the Coast Guard has been strenuously and correctly made, and that the Coast Guard clearly understands that unilateral and conflicting proposals in the states of Washington and Alaska are frustrating possible trading to these states. The situation contemplated by both the April 15 and May 13 proposals for unilateral U.S. action in conflict with IMCO adopted provisions is the same type of action exactly, except that with the more tenuous nature of international agreements such action by an important nation such as the U.S. could have a profound effect on the international scene.

As to the substance of ballast location proposal, the report of the study group, which appeared in the Coast Guard Final Environmental Impact Statement of August 1975, clearly indicates:

1. However capable the study participants, they were limited in number and had a very short time in which to consider an extremely complex subject.

2. The study participants themselves recognized this, as is clearly evident in the description of "limitation of the study" in their report.

3. The study participants closed the abstract of their report with a statement to the effect that measures other than further design provisions would most likely be most effective in preventing accidental pollution.

These points were reemphasized at the IMCO Symposium in Acapulco in March of this year, and a senior U.S. representative also made the very constructive suggestion that this entire concept should be brought to IMCO attention for a more thorough study and review before broader adoption. He noted that with present surplus market conditions for tankers, there will be a considerable amount of time for definitive study to take place before substantial numbers of new large tankers will be constructed. We share these views completely.

In conclusion, OCIMF urges you to reconsider the advisability of proceeding with the ballast location proposals for foreign tankers. It is the unanimous conviction of our member companies that very little is likely to be gained through this requirement, but that the entire future of the international regulation-making process is being put in jeopardy if such unilateral action is taken by the United States.

Very truly yours,

C. A. Walder, Executive Secretary
Oil Companies International Marine Forum

Response to Comments submitted by
Oil Companies International Marine
Forum in a letter dated June 9, 1976

COMMENT

There is one portion of the regulations with which we strenuously disagree. The proposed Section 157.08, which would be revised to require new foreign tankships over 70,000 DWT entering the navigable waters of the U. S. to comply with Section 157.09(d) concerning distribution of segregated ballast spaces clearly exceeds the requirements of the 1973 IMCO Convention and in our view should be withdrawn. We have two reasons for believing this is a very unfortunate proposal:

First, as your notice clearly states, it would represent a major unilateral requirement in excess of the provisions adopted through IMCO and, accordingly, it will serve to hamper and frustrate the effectiveness of the international regulations. It also represents an abandonment of the hopes of responsible persons in the international marine community for effective and enforceable measures developed through IMCO (typified by the remarks of Mr. Russel E. Train and Admiral Chester Bender quoted in the OCIMF letter) in favor of unilateral action.

Second, the ballast location proposal has not been studied internationally. Furthermore, on the basis of the restricted study conducted on this concept in the U. S., it appears to be of secondary value and to have been considered in relation to only a limited number of possible tanker designs or alternative measures. The entire concept should be brought to IMCO attention for a more thorough study and review before broader adoption. With present surplus market conditions for tankers, there will be a considerable amount of time for definitive study before substantial numbers of new large tankers will be built.

OCIMF urges you to reconsider the ballast location proposals for foreign tankers. Very little is likely to be gained through this requirement, but the entire future of the international regulation-making process is placed in jeopardy by such unilateral action by the United States.

RESPONSE

This comment is discussed in the response to a prior comment beginning on page 93.

INTERNATIONAL CHAMBER OF SHIPPING

TELEGRAMS : LOGBOARD, LONDON E.C 3
TELEPHONE : 01-283 2922.
TELEX : 884008

30-32 ST. MARY AXE,
LONDON, EC3A 8ET

OUR REFERENCE ICS/60/1 YOUR REFERENCE

7th June, 1976.

The Executive Secretary,
Marine Safety Council (G-CMC/81)
Room 8117,
U.S. Coast Guard Headquarters,
Washington D.C. 20590,
U.S.A.

MARINE SAFETY COUNCIL
STAFF
RECEIVED
JUN 14 1976

Dear Sir,

Proposed Rules for Carrying Oil on Certain Tank Vessels
(Federal Register Vol.41, No. 74, Thursday 15 April 1976)

The International Chamber of Shipping has the honour to submit the attached comments on the US Coast Guard's Proposed Rules for Carrying Oil on Certain Tank Vessels.

Yours faithfully,

P.W.W. GRAHAM
Secretary General

INTERNATIONAL CHAMBER OF SHIPPING

Comments on Proposed Rules for Carrying Oil on Certain Tank Vessels (Federal Register Vol. 41 No. 74 - Thursday, April 15th, 1976)

INTRODUCTION

1. The International Chamber of Shipping (ICS) is an organisation representing national shipowners' associations in 28 countries, together covering almost two-thirds of world merchant tonnage. The American Institute of Merchant Shipping (AIMS) is a prominent member of ICS.

2. ICS has noted with concern the proposals in the Federal Register for 15th April 1976 relating to the design and equipment of tankers, and offers the following comments for consideration by the Coast Guard. The remarks relate solely to those features of the proposals which are directed at foreign-flag vessels entering the navigable waters of the United States; ICS does not wish to offer comment on the requirements for United States vessels.

GENERAL

3. The broad aim of the proposals is evidently to accelerate the date on which, insofar as tankers in US navigable waters are concerned, certain provisions of Annex I of the 1973 Marine Pollution Convention take effect. Regulations covering the application of these proposals for US tankers in domestic trades have already been issued. ICS sympathises with the principle of examining methods of accelerating the entry into force of the 1973 Convention, and has itself recently taken steps in this direction by introducing the Pollution Prevention Code (Oil Tankers), the aim of which is to encourage compliance with the operable oil tanker provisions of that Convention.

4. The US proposals, however, aim to do more than accelerate the entry into force of the Convention: they seek to anticipate it, and in some cases expand upon it. Furthermore, they are directed primarily at those aspects of Annex I dealing with ship

design and equipment, matters on which maritime nations and the shipping and oil industries have consistently upheld the principle of full international agreement. ICS believes that introduction of certain of the US proposals for foreign-flag tankers would be contrary to the interests of international efforts to improve the state of the marine environment.

THE PROPOSALS

5. The proposed regulations can conveniently be divided into four sections. They are:-

(i) The requirement for segregated ballast on new tankers;
(ii) The application of cargo tank size arrangements for new tankers;
(iii) The requirement for certain design features for existing tankers;
(iv) Other requirements.

SEGREGATED BALLAST

6. The proposals are intended to introduce the Convention requirement for segregated ballast on "new" tankers of 70,000 tons dwt or above. The dates in the definition of "new vessel" in the proposals are the same as those in the Convention, and it is the intention that this requirement would take effect for foreign vessels in US navigable waters from the appropriate dates whether or not the Convention had come into force. The regulation itself (157.09) is a reflection of Regulation 13 of Annex I of the Convention.

7. This part of the proposal is, therefore, a straightforward anticipation of an internationally-agreed proposal. ICS would not wish to offer any opposition to such a proposal: it is most improbable that an owner would build a new tanker of 70,000 tons dwt or above without taking account of the segregated ballast requirements.

8. The proposals also seek, however, to regulate the distribution of the segregated ballast within the tanker, in order to optimise its contribution towards minimising outflow in the event of a casualty. ICS recognises that segregated ballast spaces may be of some value as a means of reducing spillage after an accident, but is strongly opposed to any attempt to introduce unilaterally to foreign-flag vessels detailed requirements which exceed internationally-agreed standards. Although considerable data on casualties have now been collected, segregated ballast design is only in its infancy. In the opinion of ICS, it could be counter-productive to the objective of pollution avoidance to specify at this stage the distribution of the segregated ballast spaces; and ICS believes strongly that it is unreasonable to specify a 20% reduction in the maximum hypothetical oil outflow agreed in the 1973 Convention, at least until IMCO has had an opportunity to appraise the arguments.

9. Furthermore, there is ample opportunity for IMCO to consider this question. As was recognised at the recent Symposium on Marine Pollution from Ships, held in Acapulco, there is at present little or no ordering of new tankers of 70,000 dwt and above. It was recommended at Acapulco that IMCO should take advantage of this situation, and study the distribution of segregated ballast spaces for outflow prevention purposes. ICS would welcome such study. It is essential that the critical percentages specified in section 157.09(d) (1) and (2) can be shown to produce positive effects before regulations of this nature are adopted, and there would thus be every advantage in initiating full international discussion on the subject in IMCO.

10. ICS therefore submits that there is no reason to extend the requirements of the 1973 Convention in this way insofar as foreign-flag tankers are concerned.

CARGO TANK SIZE ARRANGEMENTS

11. ICS has no practical objection to introduction of the tank size requirements: as with segregated ballast on new

tankers, we believe that no owner would build a new tanker other than in compliance with the tank size limitations. It will be appreciated, however, that there is an inconsistency between the dates from which the requirements will be applied under the 1971 amendments to the 1954 Oil Pollution Convention, and those in the 1973 Marine Pollution Convention. It seems probable that most countries will abide by the 1971 decision and adopt the requirements according to the dates in the 1971 amendments but ICS believes that the US authorities should deal sympathetically with any problems which might arise over the differences in the dates.

DESIGN FEATURES FOR EXISTING TANKERS

12. Regulations 15-17 of Annex I of the 1973 Convention introduce certain rules relating to the equipment on existing vessels. The requirements would generally take effect when the Convention enters into force, but in the case of oil discharge monitoring and control systems and slop tank arrangements, three further years are granted for existing tankers to comply.

13. The United States, on the other hand, is proposing to apply some of these rules to existing foreign tankers in US navigable waters from 31st December 1979, even though the Convention may not be in force. The acceptability of anticipating these aspects of the Convention will depend upon the extent to which existing tankers are readily capable of complying with the requirements.

14. The slop tank requirements (section 157.15) are in line with the requirements in the Convention. Almost all existing vessels have a slop tank of the required capacity, and any which do not should be able to designate a cargo tank as a slop tank without undue difficulty. ICS would therefore not wish to oppose anticipation of this requirement, though would recommend that discretion be given to accept existing vessels with purpose-built slop tanks of a volume slightly lower than the stipulated three per cent of oil carrying capacity. It was in recognition

of the problems facing ships which did not already comply with the slop tank arrangements that the Conference granted three years grace for compliance.

15. Oily residue tank (section 157.17). This section is also consistent with Regulation 17 of Annex I of the 1973 Convention. ICS thinks the provision of tank capacity to accept residues for the purification of fuel oil is a reasonable requirement, and has in fact made it a condition of acceptance of the Pollution Prevention Code (Oil Tankers). ICS therefore has no comment to offer on this section.

16. The requirements for Pumping, Piping and Discharge Arrangements (Section 157.11), however, pose problems of a different magnitude. Most existing tankers have piping so arranged that discharge to the sea is made beneath the waterline. Adaptation of pumping and piping systems to ensure discharges above the waterline is a fairly costly and complex procedure. It is impossible to predict the extent of the tanker surplus by the end of 1979, when the US proposals would take effect for foreign-flag tankers; but under normal circumstances re-arranging the piping system could be sufficiently expensive to encourage scrapping of an older tanker rather than conversion. ICS submits that the new piping arrangements will not in themselves effect a significant reduction in oil discharge during normal tanker operations, and that anticipation of this requirement would be unjustified on grounds of cost-effectiveness, especially in older vessels. For this reason ICS recommends that it be removed from the proposals for existing foreign-flag tankers.

OTHER REQUIREMENTS

17. Submission of Calculations, Plans and Specifications (section 157.24).

ICS has no comment on the objective behind this requirement, and will encourage the issue of certificates of compliance with Regulation 24 of Annex I of the 1973 Convention. It is,

however, quite unrealistic and unreasonable to expect the owner, builder or designer of a foreign vessel to submit calculations and other material to the Coast Guard before construction of the vessel, as a preamble to section 157.24 requires. The Coast Guard has a legitimate interest in the state of a foreign vessel trading to the United States, but can have no direct interest in the plans for a foreign vessel, as yet unbuilt, which may never approach the United States.

18. Vessel Operating Requirements. ICS has no comment on those sections of the operating requirements which apply to foreign vessels in US waters (157.29, 157.31 and 157.43) except in relation to section 157.43(a). This paragraph refers to section 157.37(a)(c), but section 157.37 does not apply to foreign vessels. ICS believes that there is some inconsistency in this cross-reference, and would in any event submit that the requirement for an automatic oil discharge monitoring and control system as a condition of discharge of clean ballast is unrealistic at this stage. Equipment capable of the degree of accuracy needed is not yet available, and ICS would welcome clarification of the Coast Guard's proposals in this respect for foreign vessels.

JURISDICTIONAL ISSUES

19. This paper has concentrated on the practical effects of the US proposals. There are, however, some extremely important jurisdictional issues which must be considered.

20. The application of the proposals to foreign vessels is to "foreign tank vessels in U.S. waters". Elsewhere the proposals talk about extending existing regulations in order to cover "foreign flag tankers of 150 gross tons or more that enter the navigable waters of the United States".

21. It is unclear from this wording whether the United States is seeking to apply the rules solely to foreign vessels trading to or from U.S. ports or entering internal waters, or also to foreign vessels exercising the right of innocent passage through the territorial waters of the United States. If the latter, ICS would submit that the proposals are directly contrary not only

to the approach currently adopted by the U.N. Conference on the Law of the Sea, but also to international law as it stands today. The latest Single Negotiating Text for Committee II, produced on conclusion of the recent New York session, maintains the specific exclusion from the powers of the coastal state of the right to impose regulations relating to the design, construction, equipment or manning of a foreign vessel in the territorial sea.

22. In some respects the U.S. proposals are in line with the provisions of the 1973 Convention; but there has been no international debate on the distribution of segregated ballast, and in this respect the proposals clearly exceed the coastal state powers which seem likely to be agreed in the Law of the Sea Conference.

23. It is arguable, furthermore, that anticipation of the Convention dates in respect of certain provisions for new vessels, as provided for in the US proposals, would also be outside the interpretation of international agreement as conceived in the Law of the Sea discussions.

24. Any unilateral action which runs counter to international law as accepted by states is always to be deplored; it would be particularly unfortunate and counter-productive when the next session of the Law of the Sea Conference is shortly to commence, and might lead to similar unilateral action by other states. ICS strongly recommends that the Coast Guard consider these issues carefully.

CONCLUSION

25. ICS hopes these remarks will be of help to the Coast Guard, and that they will be taken into full account. ICS will readily provide further information on any points if so requested.

Response to Comments submitted by the
International Chamber of Shipping in
a letter dated June 7, 1976

COMMENT

ICS recognizes that segregated ballast spaces may be of some value as a means of reducing spillage after an accident, but is strongly opposed to any attempt to introduce unilaterally to foreign-flag vessels detailed requirements which exceed internationally-agreed standards. It could be counter-productive to the objective of pollution avoidance to specify at this stage the distribution of the segregated ballast spaces; and ICS believes strongly that it is unreasonable to specify a 20% reduction in the maximum hypothetical oil outflow agreed in the 1973 Convention, at least until IMCO has had an opportunity to appraise the arguments. It is essential that the critical percentages specified in section 157.09(d)(1) and (2) can be shown to produce positive effects before regulations of this nature are adopted. There is ample time for IMCO to consider these questions, since there is at present little or no ordering of new tankers over 70,000 DWT. There is therefore no reason to extend the requirements of the 1973 Convention in this way insofar as foreign-flag tankers are concerned.

RESPONSE

The response to this comment is discussed in the response to a prior comment beginning on page 93.

COMMENT

The requirements for pumping, piping and discharge arrangements in section 157.11 pose problems for existing tankers. Most existing tankers have piping arranged so that discharges to the sea is made beneath the waterline. Adaptation of pumping and piping systems to ensure discharges above the waterline is a fairly costly and complex procedure. Re-arranging the piping system could be sufficiently expensive to encourage scrapping of an older tanker rather than conversion (depending on market conditions at the time). ICS submits that the new piping arrangements will not in themselves effect a significant reduction in oil discharge during normal tanker operations, and that anticipation of this requirement would be unjustified on older vessels. For this reason ICS recommends that it be removed from the proposals for existing foreign-flag tankers.

RESPONSE

The response to this comment is discussed in the response to a prior comment (page 92).

COMMENT

It is unclear whether the United States is seeking to apply the rules solely to foreign vessels trading to or from U. S. ports or entering internal waters, or also to foreign vessels exercising the right of innocent passage through the territorial waters of the United States. If the latter, ICS would submit that the proposals are directly contrary not only to the approach currently adopted by the U. N. Conference on the Law of the Sea, but also to international law as it stands today. The latest Single Negotiating Text for Committee II, produced on conclusion of the recent New York session, maintains the specific exclusion from the powers of the coastal state of the right to impose regulations relating to the design, construction, equipment or manning of a foreign vessel in the territorial sea.

There has been no international debate on the distribution of segregated ballast, and in this respect the proposals clearly exceed the coastal state powers which seem likely to be agreed in the Law of the Sea Conference.

It is arguable that anticipation of the Convention dates in respect of certain provisions for new vessels, as provided for in the U. S. proposals, would also be outside the interpretation of international agreement as conceived in the Law of the Sea discussions.

Any unilateral action which runs counter to international law as accepted by states is always to be deplored; it would be particularly unfortunate and counter-productive when the next session of the Law of the Sea Conference is shortly to commence, and might lead to similar unilateral action by other states. ICS strongly recommends that the Coast Guard consider these issues carefully.

RESPONSE

This commenter stated that it is unclear whether or not the proposed requirements apply to foreign vessels trading to or from U. S. ports, entering internal waters, or exercising the right of innocent passage through the territorial waters of the United States.

The language with which the commenter has difficulty is taken from the law under which the regulations are proposed, Title II of the Ports and Waterways Safety Act of 1972, as amended, 46 U.S.C. 391a. That language is as follows:

> "All vessels, regardless of tonnage, size, or manner of propulsion, and whether self-propelled or not, and whether carrying freight or passengers for hire or not, which are documented under the laws of the United States or enter the navigable waters of the United States (underscoring supplied), except public vessels other than those engaged in commercial service, that shall have on board liquid cargo in bulk . . ."

There was nothing in the regulations, nor in the Coast Guard's intent in proposing the regulations, to challenge the international law concept of innocent passage. However, since the regulations appear not to be clear in this respect, 157.01(a)(2) will be changed by adding the words "to engage in commercial service" after the words "United States."

A commenter suggested that the proposed distribution of ballast exceeds the coastal state powers to be agreed upon by the Law of the Sea Conference. Also, this commenter states that the proposed dates used for new vessels that anticipate the 1973 Convention is outside the interpretation of international agreement as conceived in the Law of the Sea discussion. Since the Law of the Sea is only in the drafting stage, it can have no impact, at this time, in the proposed regulations. Nevertheless, it should be pointed out to the commenter that the powers exercised under these regulations are those of a port state and not coastal state.

COMMENT

ICS has no comment on those sections of the operating requirements which apply to foreign vessels in US waters, except in relation to section 157.43(a). This paragraph refers to section 157.37(a)(6), but section 157.37 does not apply to foreign vessels. ICS believes that there is some inconsistency in this cross-reference, and would in any event submit that the requirement for an automatic oil discharge monitoring and control system as a condition of discharge of clean ballast is unrealistic at this stage. Equipment capable of the degree of accuracy needed is not yet available, and ICS would welcome clarification of the Coast Guard's proposals in this respect for foreign vessels.

RESPONSE

The Coast Guard agrees there is an inconsistency here. For clarification, section 157.25(a) has been changed by adding a section 157.37(a)(6) to the list of requirements that apply to foreign vessels when they discharge into the navigable waters of the United States. In addition, section 157.25(b) has been changed to exclude 157.37(a)(6) from the list of requirements that do not apply to foreign vessels.

The Coast Guard is aware of equipment limitations of oil discharge monitoring and control systems and will not enforce the requirement for such systems until a specification regulation for this equipment is published in the FEDERAL REGISTER, after the public participates in the rule making procedure. The Coast Guard anticipates publishing a proposed specification within the next six months.

REFERENCES

1. U. S. Coast Guard, Final Environmental Impact Statement, Regulations for Tank Vessels Engaged in the Carriage of Oil in Domestic Trade, Protection of the Marine Environment, Washington, D. C., 1975.

2. National Academy of Sciences, Petroleum in the Marine Environment, Washington, D. C., 1975.

3. British Petroleum Company, Limited, BP Statistical Review of the World Oil Industry - 1973, London, 1974.

4. J. E. Shewmaker, R. R. Goodrich, Jr., and R. J. Skocypec, "Characterization of Ballast Water," Report EE.3MTR.74, prepared by Esso Research and Engineering Company for the Maritime Administration (Contract C-1-35049), April 1974.

5. H. Santiago and C. Chappell, "Final Report on Oil Discharge Characteristics of Product Oil Tankers," Office of Water Programs Operations, Division of Oil and Hazardous Materials, Environmental Protection Agency, September 1973.

6. U. S. Department of Commerce, Maritime Administration, Final Environmental Impact Statement: Maritime Administration Tanker Construction Program, NTIS Report No. EIS 730725-F, Washington, D. C., 1973.

7. M. P. Holdsworth, "Ballast and Wash Waters from Tankers," in Water Pollution by Oil, London, 1971.

8. J. D. Porricelli, V. F. Keith, and R. L. Storch, 1971, "Tankers and the Ecology," Transactions SNAME, 1971.

9. G. Victory, 1973, "The Load on Top System, Present and Future," pp. 10-20, Symposium on Marine Pollution, Royal Institute of Naval Architects, London.

APPENDIX A

Assumptions and Calculations used to develop Table 3, Comparison of oil inputs from tank cleaning and ballasting for U. S. tankships in foreign trade and foreign tankships carrying oil and entering the navigable waters of the United States.

Appendix A to Draft EIS

Assumptions and calculations used to develop Table 3. Comparison of oil inputs from tank cleaning and ballasting for U. S. tankships in foreign trade and foreign tankships carrying oil which enter the navigable waters of the U. S.

A. Present oil inputs

1. U. S. tankships in foreign trade - taken from Table 4, page 36 of reference (1)

2. Foreign tankships trading to U. S.

a. Crude and residual oil tankers not using LOT/ROB techniques

Assume (1) 186×10^6 metric tons of crude and residual oil are carried into or out of U. S. ports by foreign tankships each year (from line 1, Table 3, p. 32 of reference (1), neglecting any oil exports from U. S. ports).

(2) 80% of such tankers use LOT/ROB (20% do not).

(3) LOT is 90% effective in avoiding oil discharge (10% ineffective).

(4) 0.4% of the cargo remains in the vessel following discharge, i.e., clingage factor of 0.004.

(5) 1/3 of tanks are cleaned and/or ballasted each voyage, 1/5 of the tanks are ballasted prior to departure from the discharge port (i.e., dirty ballast equals 1/5 of DWT).

(6) On LOT tankers 15% of the clingage remaining in a tank is discharged to the sea when dirty ballast is decanted to the sea.

(7) On non-LOT tankers, 80% of the clingage remaining in a tank is discharged to the sea when dirty ballast is pumped overboard.

(Note: These assumptions are based on information in the references listed at the end of this appendix. They are similar to the assumptions used in previous similar calculations in the Maritime Administration Tanker Construction Program EIS (page IV-2) and the final EIS on regulations for tank vessels in domestic trade (page 308.)

Using these assumptions, the oil discharged to the sea by foreign LOT tankers is:

Amount from tank washing + amount from dirty ballast

$(186 \times 10^6)(.8)(.1)(.004)(.33) + (186 \times 10^6)(.8)(.004)(.2)(.15)$

19,641 + 17,856

A portion of the tank washing is done for clean ballast and a portion for sediment control and routine maintenance. Assume that half of the tank cleaning is for ballast and half for sediment control. (This is the same as saying that if there was no need to clean tanks for clean ballast, 1/6 of the tanks would still be cleaned each voyage for sediment control.) Then the amounts discharged are:

19,641 (.5) + 17,856 = 27,676 for clean ballast

and 19,641 (.5) = 9,820 for clean sediment control.

b. Crude and residual oil tankers not using LOT/ROB

Using the same assumptions as above, oil released to the sea equals

$(186 \times 10^6)(.2)(.004)(.33) + (186 \times 10^6)(.2)(.004)(.2)(.8)$

49,104 + 23,808

Again, assume that half the tank cleaning is for clean ballast and half for sediment control. Then, the amounts discharged are:

49,104 (.5) + 23,808 = 48,360 tons for clean ballast

and 49,104 (.5) = 24,552 tons for sediment control

In summary,

for clean ballast	LOT	27,676
	non-LOT +	48,360
	Total	76,036
and for sediment control	LOT	9,820
	non-LOT +	24,552
	Total	34,372

These values appear in Column 2 of Table 3.

c. Product carriers, foreign tankships trading into U. S.

Assume: (1) 23×10^6 metric tons of product are carried into or out of U. S. ports by foreign tankships each year. (from line 5 , Table 3, p. 32 of reference (1), neglecting any oil exports from U. S. ports).

(2) 0.075% of the cargo remains in the vessel following discharge, i.e., clingage factor of 0.00075

(3) 80% of tankers are cleaned each trip

(4) 90% of tank washings are discharged to the sea and 10% are discharged to shore reception facilities

Using these assumptions, oil released to the sea is:

$(23 \times 10^6)(0.00075)(.8)(.9) = 12{,}420$ tons

d. Tank cleaning prior to entering shipyard

Assume: (1) One complete cleaning every 1.5 years

(2) Clingage of 0.004

(3) 50% of washings discharged to the sea, 50% to shore reception facility

(4) 10.5% of world's tanker fleet of 257 million deadweight tons will be subject to these regulations. (10.5% from page 14 of B. P. Statistical Review of the World Oil Industry - 1973, British Petroleum Corporation,

Then, the amount of oil input $= \frac{1}{1.5} (.004)(.5)(.105)(257 \times 10^6) = 27{,}700$ tons

B. Oil inputs if maximum of 1/15,000 of cargo is discharged to the oceans from U. S. tank vessels in foreign trade and foreign tankers carrying oil into or out of U. S. ports.

1. U. S. tankships in foreign trade, crude and residual oil

Assume (1) 10 million tons of crude oil and residual oil is carried annually by U. S. tankships in foreign trade (B.1.a, p 310 of reference (1), Line 2, Table 3, p. 32 of reference (1)

(2) All of these vessels will use improved LOT/ROB techniques, discharging no more than 1/15,000 of the cargo transported.

Then the amount entering the oceans is
10^6 (1/15,000) = 66.7 tons

2. Foreign tankships carrying crude and residual oil into or out of U. S. ports

Assume: (1) 186×10^6 tons of crude oil and residual oil is carried annually by foreign tankships to and from U. S. ports (from line 1, Table 3, p. 32 of reference (1), neglecting any oil exports from U. S. ports)

(2) All these vessels will use improved LOT/ROB techniques, discharging no more than 1/15,000 of the cargo transported.

Then, the amount discharged is
186×10^6 (1/15,000) = 12,400 tons

3. U. S. tankships in foreign trade, refined products

Assume (1) 10^6 tons transported (line 6, Table 3, page 32, reference (1)

(2) Use of improved LOT/ROB limits discharge to 1/15,000 DWT

Then, amount discharged = 10^6(1/15,000) = 66.6 tons

4. Foreign tankships carrying refined products into or out of U. S. ports

Assume: (1) 23×10^6 tons transported (line 5, Table 3, p.32, reference (1)

(2) Use of improved LOT/ROB limits discharge to 1/15,000 DWT

Then, amount discharged = (23×10^6) (1/15,000) = 1,533 tons

5. Tank cleaning prior to entering shipyard

Assume: (1) Complete cleaning every 1.6 years

(2) U. S. fleet in foreign trade = 2×10^6 DWT of shipping

(from "Tank Vessels, Employment of U. S. Flag oceangoing Tank Vessels as of December 31, 1974," Department of Commerce, Maritime Administration, Office of Subsidy Administration, Division of Trade Studies and Statistics)

(3) 10.5% of world's tanker fleet of 257 million deadweight tons serves U. S. ports (27×10^6 DWT)

(4) Equivalent of 1/15,000 of DWT discharged to the sea

Then, amount from U. S. vessels in foreign trade =

$$\frac{1}{1.5}(2 \times 10^6)\ (1/15{,}000) = 89$$

and from foreign vessels =

$$\frac{1}{1.5}(27 \times 10^6)\ (1/15{,}000) = 1200$$

APPENDIX B

CODE OF FEDERAL REGULATIONS, TITLE 33, PART 157
RULES FOR THE PROTECTION OF THE MARINE ENVIRONMENT
RELATING TO TANK VESSELS CARRYING OIL IN BULK

This Appendix contains the rules in 33 CFR Part 157 as they will appear after incorporating changes to be published by the Coast Guard as a final rulemaking at approximately the same time the final environmental impact statement is made available to the President's Council on Environmental Quality and to the public. This appendix incorporates rules originally published in Federal Register editions:

40 FR 48280	October 14, 1975
41 FR 1479	January 8, 1976
41 FR 15859	April 15, 1976

PART 157—RULES FOR THE PROTECTION OF THE MARINE ENVIRONMENT RELATING TO TANK VESSELS CARRYING OIL IN BULK

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157.45 Valves in cargo or ballast piping system.
157.47 Information for master.
157.49 Instruction manual.
Appendix A Damage assumptions, hypothetical outflows, and cargo tank size and arrangements.
Appendix B Subdivision and Stability Assumptions.

AUTHORITY: R.S. 4417a(3) and (7), as amended (46 U.S.C. 391a(3) and (7)); 49 CFR 1.46(n)(4).

Subpart A—General

§ 157.01 Applicability.

(a) This part prescribes design, equipment, and operation requirements for tank vessels of 150 gross tons or more carrying oil in bulk that—

(1) are documented under the laws of the United States (U.S. vessels); or

(2) are not U.S. vessels and enter the navigable waters of the United States (foreign vessels).

(b) This part does not apply to public vessels not engaged in commercial service.

NOTE: Additional requirements for U.S. vessels are found in 46 CFR Subchapters O and D.

§ 157.03 Definitions.

As used in this part:

(a) "Length" or "L" means the distance in meters from the fore side of the stem to the axis of the rudder stock on a waterline at 85 percent of the least molded depth measured from the molded baseline, or 96 percent of the total length on that waterline, whichever is greater. In vessels designed with drag, the water line is measured parallel to the designed waterline.

(b) "Amidships" means the middle of the length.

(c) "Breadth" or "B" means the maximum molded breadth of a vessel in meters.

(d) "Center tank" means any tank inboard of a longitudinal bulkhead.

(e) "Clean ballast" means the ballast in a cargo tank which, if discharged from a vessel that is stationary into clean, calm water on a clear day, would not—

(1) produce visible traces of oil on the surface of the water or on adjoining shore lines; or

(2) cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shore lines.

(f) "Combination carrier" means a vessel designed to carry oil or solid cargoes in bulk.

(g) "Deadweight" or "DWT" means the difference in metric tons between the lightweight displacement and the total displacement of a vessel measured in water of specific gravity 1.025 at the load waterline corresponding to the assigned summer freeboard.

(h) "Lightweight" means the displacement of a vessel in metric tons without cargo, oil fuel, lubricating oil, ballast water, fresh water, and feedwater in tanks, consumable stores, and any persons and their effects.

(i) "New vessel" means—

(1) a U.S. vessel in domestic trade that—(i) is constructed under a contract awarded after December 31, 1974;

(ii) in the absence of a building contract, has the keel laid or is at a similar stage of construction after June 30, 1975;

(iii) is delivered after December 31, 1977; or

(iv) has undergone a major conversion for which—(A) the contract is awarded after December 31, 1974;

(B) in the absence of a contract, conversion is begiun after June 30, 1975; or

(C) conversion is completed after December 31, 1977; and

(2) a foreign vessel or a U.S. vessel in foreign trade that—(i) is constructed under a contract awarded after December 31, 1975;

(ii) in the absence of a building contract, has the keel laid or is at a similar stage of construction after June 30, 1976;

(iii) is delivered after December 31, 1979; or

(iv) has undergone a major conversion for which—(A) the contract is awarded after December 31, 1975;

(B) in the absence of a contract, conversion is begun after June 30, 1976; or

(C) conversion is completed after December 31, 1979.

(j) "Existing vessel" means any vessel that is not a new vessel.

(k) "Major conversion" means a conversion of an existing vessel that—

(1) substantially alters the dimensions or carrying capacity of the vessel;

(2) changes the type of the vessel; or

(3) substantially prolongs the vessel's service life.

(l) "From the nearest land" means from the baseline from which the territorial sea of the United States is established in accordance with international law.

(m) "Instantaneous rate of discharge of oil content" means the rate of discharge of oil in liters per hour at any instant, divided by the speed of the vessel in knots at the same instant.

(n) "Oil" means oil of any kind or in any form, except petrochemicals, and includes but is not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

(o) "Oil fuel" means any oil used as fuel for machinery in the vessel in which it is carried.

(p) "Oily mixture" means a mixture with any oil content.

(q) "Permeability of a space" means the ratio of the volume within a space that is assumed to be occupied by water to the total volume of that space.

(r) "Segregated ballast" means the ballast water introduced into a tank that is completely separated from the cargo oil and oil fuel system and that is permanently allocated to the carriage of ballast.

(s) "Slop tank" means a tank specifically designated for the collection of cargo drainings, washings, and other oil mixtures.

(t) "Tank" means an enclosed space that is formed by the permanent structure of a vessel, and designed for the carriage of liquid in bulk.

(u) "Tank barge" means a tank vessel not equipped with a means of self-propulsion.

(v) "Tank vessel" means a vessel that is specially constructed or converted to carry liquid bulk cargo in tanks and includes tankers, tankships, tank barges, and combination carriers when carrying oil cargoes in bulk.

(w) "Foreign trade" means any trade that is not domestic trade.

(x) "Wing tank" means a tank that is located adjacent to the side shell plating.

(y) "Tankship" means a tank vessel propelled by mechanical power or sail.

(z) "Domestic trade" means trade between ports or places within the United States, its territories and possessions, either directly or via a foreign port including trade on the navigable rivers, lakes, and inland waters.

(aa) "Cargo tank length" means the length from the collision bulkhead to the forward bulkhead of the machinery spaces.

§ 157.05 Performing calculations for this part.

In this part, unless the context requires otherwise—

(a) formulas are in the International System of Units (SI);

(b) values used in those formulas must be in the International System of Units; and

(c) forward and after perpendiculars are located at the forward end and at the after end of the length. The forward perpendicular coincides with the foresize of the stem on the waterline on which the length of the vessel is measured.

§ 157.07 Equivalents.

The Coast Guard may accept an equivalent, in accordance with the procedure in 46 CFR 30.15–1, of a design or an equipment to fulfill a requirement in this part except an operational method may not be substituted for a design or equipment requirement.

Subpart B—Design and Equipment

§ 157.08 Applicability of subpart B.

This subpart applies to vessels under this part that are seagoing except as follows:

(a) Section 157.21 also applies to vessels under this part on voyages on the Great Lakes.

(b) Sections 157.11, 157.13, and 157.15 do not apply to a tank vessel that carries only asphalt.

(c) Sections 157.11, 157.13, 157.15, and 157.23 do not apply to a tank barge that can not ballast cargo tanks or wash cargo tanks while proceeding en route.

(d) Sections 157.19 and 157.21 do not apply to a tank barge whose certificate is endorsed by the Coast Guard for a limited short protected coastwise route if the barge is constructed and certificated primarily for service on an inland route.

(e) Section 157.09(d) does not apply to any—

(1) U.S. vessel in domestic trade that is constructed under a contract awarded before January 8, 1976;

(2) U.S. vessel in foreign trade that is constructed under a contract awarded before (effective date of regulations to be inserted); or

(3) foreign vessel that is constructed under a contract awarded before (effective date of regulations to be inserted).

§ 157.09 Segregated ballast.

(a) A new vessel of 70,000 tons DWT or more must have segregated ballast tanks that have a total capacity to allow the vessel to meet the draft and trim requirements in paragraph (b) of this section without recourse to the use of oil tanks for water ballast.

(b) In any ballast condition during any part of a voltage, including that of lightweight with only segregated ballast, the vessel's drafts and trim must have the capability of meeting each of the following requirements:

(1) The molded draft amidship (dm) in meters without taking into account vessel deformation must not be less than dm in the following mathematical relationship:

$$dm = 2.0 + 0.02L$$

(2) The drafts at the forward and after perpendiculars must correspond to those determined by the draft amidship as specified in paragraph (b)(1) of this section, in association with the trim by the stern of no more than 0.015L.

(3) The minimum allowable draft at the after perpendicular is that which is necessary to obtain full immersion of the propeller.

(c) The vessel may be designed to carry ballast water in cargo tanks during the condition described in § 157.35.

(d) Segregated ballast spaces, voids, and other noncargo-carrying spaces for a vessel of conventional form must be distributed—

(1) So that the mathematical average of the hypothetical collision (O_c) and the hypothetical stranding (O_s) outflows as determined by the application of the procedures in § 157.19 and Appendix B is 80 percent or less of the maximum allowable outflow (O_a) as determined by paragraph 157.19(b)(1); and

(2) To protect at least 45 percent of the sum of the side and bottom shell areas, based upon projected molded dimensions, within the cargo tank length.

When the vessel design configuration does not provide for the spaces to be distributed to protect at least 45 percent of the side and bottom shell areas, the spaces must be distributed so that the mathematical average of the hypothetical collision (O_c) and the hypothetical stranding (O_s) outflows, determined by application of the procedures in § 157.19 and Appendix B, is a further 2 percent less than the maximum allowable outflow (O_a) for each 1 percent by which the shell area protection coverage required is not achieved.

(e) A ballast space, void or other noncargo-carrying space used to meet requirements in paragraph (d) of this section must separate the cargo tank boundaries from the shell plating of the vessel by at least 2 meters.

(f) A vessel of conventional form for application of this section has—

(1) A block coefficient of .80 or greater,

(2) A length to depth ratio between 12 and 16, and

(3) A breadth to depth ratio between 1.5 and 3.5.

(g) Segregated ballast spaces, voids, and other noncargo-carrying spaces for a vessel not of conventional form must be distributed in a configuration acceptable to the Coast Guard.

§ 157.11 Pumping, piping, and discharge arrangements.

(a) Each tank vessel must have a fixed piping system arranged for the—

(1) transfer of dirty ballast residue and tank washings from each cargo tank to a slop tank;

(2) discharge to the sea under § 157.37; and

(3) discharge in a port or at an offshore terminal under § 157.43.

(b) Each tank vessel must have the fixed piping system arranged to, for discharges under paragraph (a)(2) of this section, terminate above the weather deck or on the vessel's side above the waterline of the deepest ballast condition.

(c) Each tank vessel must have a cargo or ballast discharge manifold that—

(1) is located on the weather deck;

(2) terminates on each side of the vessel; and

(3) is connected to the piping system required in paragraph (a)(1) of this section for the transfer to a reception facility of oily mixtures that cannot be discharged under §§ 157.37 or 157.43.

Effective date of § 157.11. An existing vessel that is a U.S. vessel in domestic trade must comply with § 157.11 before December 31, 1977. An existing vessel that is a foreign vessel or a U.S. vessel in foreign trade must comply with § 157.11 before December 31, 1979.

§ 157.13 Designated observation area.

A new vessel must have a designated observation area on the weather deck or above that is—

(a) located so that the effluent from the pipeline terminations required in § 157.11(a) and the manifold required in § 157.11(c) may be visually observed; and

(b) equipped with—

(1) a means to directly stop the discharge of effluent into the sea; or

(2) a positive communication system, such as a telephone or a radio, between the observation area and the discharge control position.

§ 157.15 Slop tanks in tank vessels.

(a) *Number.* A tank vessel must have the following number of slop tanks that comply with the requirements of this section:

(1) A new vessel of less than 70,000 tons DWT and an existing vessel must have at least one slop tank.

(2) A new vessel of 70,000 tons DWT or more must have at least two slop tanks.

(b) *Capacity.* Slop tanks required in this section must have a capacity to retain two percent or more of the oil carrying capacity of the vessel except nonsegregated ballast tank vessels that have tank eductors installed must have a slop tank capacity of three percent or more of the oil carrying capacity of the vessel.

(c) *Design.* A slop tank required in this section—

(1) must minimize turbulence, entrainment of oil, and the creation of an emulsion by the use of separate inlet and outlet connections; and

(2) may carry bulk oil when not being used as a slop tank.

Effective date of § 157.15. An existing vessel that is a U.S. vessel in domestic trade must comply with § 157.15 before December 31, 1977. An existing vessel that is a foreign vessel of a U.S. vessel in foreign trade must comply with § 157.15 before December 31, 1979.

§ 157.17 Oily residue tank.

(a) A tank vessel of 400 gross tons or more must have a tank that receives and holds oily residue resulting from purification of fuel and lubricating oil and from oil leakages in machinery spaces.

(b) Each oily residue tank required in paragraph (a) of this section must have an adequate capacity that is determined by the—

(1) type of machinery installed on the vessel; and

(2) maximum fuel oil capacity.

(c) Each oily residue tank on a new vessel must be designed to facilitate—

(1) cleaning; and

(2) discharging to a reception facility.

Effective date of § 157.17. An existing vessel that is a U.S. vessel in domestic trade must comply with § 157.17 (a) and (b) before December 31, 1977. An existing vessel that is a foreign vessel or a U.S. vessel in foreign trade must comply with § 157.17 (a) and (b) after December 31, 1979.

§ 157.19 Cargo tank arrangement and size.

(a) This section applies to—(1) A U.S. or foreign vessel that is delivered after January 1, 1977;

(2) A U.S. vessel that is delivered before January 1, 1977, for which the building contract is awarded after January 1, 1972, or, if there is no building contract, the keel is laid or the vessel is at a similar stage of construction after June 30, 1972; and

(3) A foreign vessel that is delivered before January 1, 1977, for which the building contract is awarded after January 1, 1974, or if there is no building contract, the keel is laid or the vessel is at a similar stage of construction after June 30, 1974.

(b) As determined in accordance with the procedures contained in Appendix A of this part, each cargo tank must be of such size and arrangement that—

(1) the hypothetical outflow for side damage (O_c) or for bottom damage (O_s) anywhere within the length of the vessel must not exceed O_A (30,000 cubic meters or $400\sqrt[3]{DWT}$, whichever is greater, limited to a maximum of 40,000 cubic meters);

(2) the volume of each wing tank and center tank is less than the allowable volume of a wing tank (VOL_w) and the allowable volume of a center tank (VOL_c) respectively; and

(3) the length of a tank is less than the allowable length of a tank (l_a).

(c) If a cargo transfer system interconnects two or more cargo tanks, the system must have valves to segregate the tanks from each other.

(d) If a line of piping that runs through a cargo tank in a position less than t_c from the vessel's side or less than v_s from the vessel's bottom, as defined in Appendix A of this part, has a branch, that branch must have a valve within each cargo tank into which the branch opens.

(e) If piping that serves suction wells is installed within a double bottom, that piping must be—

(1) fitted with valves located at the point of connection to the tank served to prevent oil outflow in the event of damage to the piping; and

(2) designed to be installed as high from the bottom shell as possible.

Effective date of § 157.19. Vessels to which § 157.19(a)(2) applies must meet § 157.19 before December 31, 1976; however, if a vessel is constructed under a contract awarded before January 1, 1974 and does not carry crude oil, fuel oil, heavy diesel oil, or lubricating oil, the requirements in § 157.19 do not apply. Vessels to which § 157.19(a)(3) apply must meet § 157.19 before June 30, 1978.

CROSS REFERENCE: See 33 CFR 151.50 (39 FR 30125) for an interpretative rule concerning tank arrangement and size limitations applicable to seagoing tank barges.

§ 157.21 Subdivision and stability.

A new vessel that is a U.S. vessel must meet the following subdivision and damage stability criteria after assuming side and bottom damages as defined in Appendix B of this Part. A U.S. vessel that meets the requirements in this section is considered by the Coast Guard as meeting 46 CFR 42.20-5.

(a) The final waterline, taking into account sinkage, heel, and trim, must be below the lower edge of an opening through which progressive flooding may take place, such as an air pipe, or any opening that is closed by means of a weathertight door or hatch cover. This opening does not include an opening closed by a—

(1) watertight manhole cover;

(2) flush scuttle;

(3) small watertight cargo tank hatch cover that maintains the high integrity of the deck;

(4) remotely operated watertight sliding door; or

(5) side scuttle of the non-opening type.

(b) In the final stage of flooding, the angle of heel due to unsymmetrical flooding must not exceed 25 degrees, except that this angle may be increased to 30 degrees if no deck edge immersion occurs.

(c) For acceptable stability in the final stage of flooding, the righting lever curve must have a range of at least 20 degrees beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 meter. For the calculations required in this section, weathertight openings or openings fitted with automatic closures, (*e.g.* a vent fitted with a ball check valve), need not be considered as points of downflooding within the range of residual stability, but other openings must be accounted for in the calculation.

§ 157.22 [Reserved]

§ 157.23 Cargo and ballast system information.

(a) Each tank vessel to which this part applies must have an instruction manual that describes the automatic and manual operation of the cargo and ballast system in the vessel.

(b) The format and information contained in the instruction manual required in paragraph (a) of this section must be similar to the manual entitled "Clean Seas Guide for Oil Tankers" which can be obtained from the International Chamber of Shipping, 30–32 St. Mary Axe, London, England, EC3A 8ET.

§ 157.24 Submission of calculations, plans, and specifications.

The owner, builder, or designer of a new vessel shall submit the following to the Coast Guard before construction of the vessel:

(a) Calculations to substantiate compliance with the tank arrangement and size requirements under § 157.19, or a letter from the government of the vessel's flag state that certifies compliance with—(1) Section 157.19; or

(2) Regulations 24 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973.

(b) Except for a new vessel that is a foreign vessel, calculations to substantiate compliance with subdivisions and damage stability requirements under § 157.21.

(c) Calculations to substantiate compliance with the segregated ballast distribution requirements in § 157.09(d).

(d) Plans and specifications for the vessel that include—

(1) design characteristics;

(2) a lines plan;

(3) curves of form (hydrostatic curves);

(4) a general arrangement plan of each deck and level;

(5) *inboard and outboard profile plans* showing oiltight and watertight bulkheads;

(6) a midship section plan;

(7) a capacity plan showing the capacity and the vertical and longitudinal centers of gravity of each cargo space, tank, and similar space;

(8) tank sounding tables;

(9) draft mark locations;

(10) detailed plans of watertight doors; and

(11) detailed plans of vents.

Subpart C—Vessel Operation

§ 157.25 *Exceptions to applicability.*

(a) Sections 157.29, 157.31, and 157.43 apply to foreign vessels when they discharge into the navigable waters of the United States.

(b) Sections 157.35, 157.37, 157.39, 157.45, and 157.47 do not apply to foreign vessels.

§ 157.27 Discharges: Tank vessels carrying oil exclusively on rivers, lakes, bays, sounds, and the Great Lakes, and seagoing tank vessels of less than 150 gross tons.

Unless a tank vessel carrying oil exclusively on rivers, lakes, bays, sounds, and the Great Lakes, or a seagoing tank vessel of less than 150 gross tons discharges clean ballast or segregated ballast, the vessel must—

(a) retain on board any oily mixture; or

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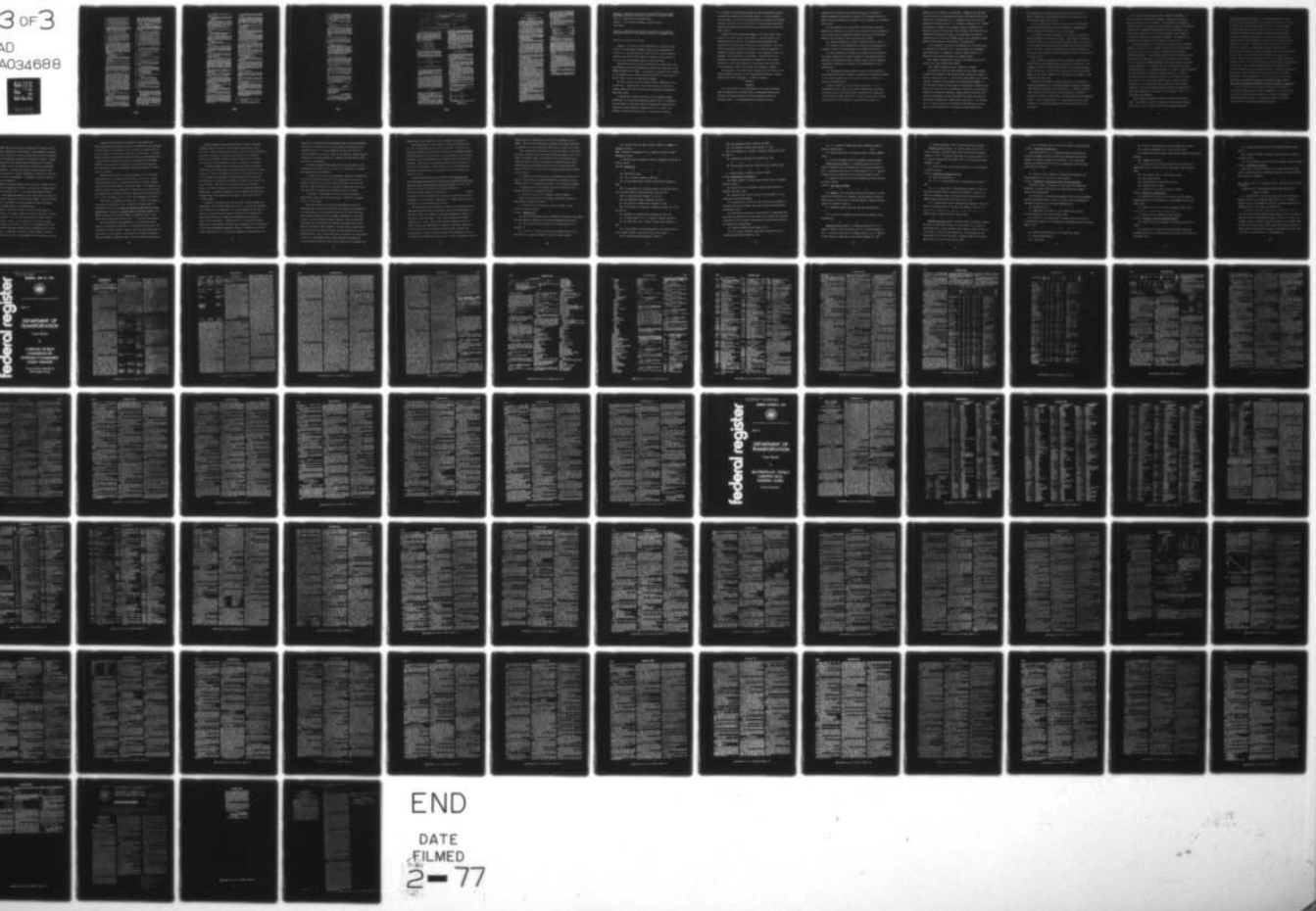

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Effective date of § 157.19. Vessels to which § 157.19(a)(2) applies must meet § 157.19 before December 31, 1976; however, if a vessel is constructed under a contract awarded before January 1, 1974 and does not carry crude oil, fuel oil, heavy diesel oil, or lubricating oil, the requirements in § 157.19 do not apply. Vessels to which § 157.19(a)(3) apply must meet § 157.19 before June 30, 1978.

CROSS REFERENCE: See 33 CFR 151.50 (39 FR 30125) for an interpretative rule concerning tank arrangement and size limitations applicable to seagoing tank barges.

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A new vessel that is a U.S. vessel must meet the following subdivision and damage stability criteria after assuming side and bottom damages as defined in Appendix B of this Part. A U.S. vessel that meets the requirements in this section is considered by the Coast Guard as meeting 46 CFR 42.20-5.

(a) The final waterline, taking into account sinkage, heel, and trim, must be below the lower edge of an opening through which progressive flooding may take place, such as an air pipe, or any opening that is closed by means of a weathertight door or hatch cover. This opening does not include an opening closed by a—

(1) watertight manhole cover;

(2) flush scuttle;

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(4) remotely operated watertight sliding door; or

(5) side scuttle of the non-opening type.

(b) In the final stage of flooding, the angle of heel due to unsymmetrical flooding must not exceed 25 degrees, except that this angle may be increased to 30 degrees if no deck edge immersion occurs.

(c) For acceptable stability in the final stage of flooding, the righting lever curve must have a range of at least 20 degrees beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 meter. For the calculations required in this section, weathertight openings or openings fitted with automatic closures, (*e.g.* a vent fitted with a ball check valve), need not be considered as points of downflooding within the range of residual stability, but other openings must be accounted for in the calculation.

§ 157.22 [Reserved]

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(2) Regulations 24 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973.

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(c) Calculations to substantiate compliance with the segregated ballast distribution requirements in § 157.09(d).

(d) Plans and specifications for the vessel that include—

(1) design characteristics;

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(3) curves of form (hydrostatic curves);

(4) a general arrangement plan of each deck and level;

(5) inboard and outboard profile plans showing oiltight and watertight bulkheads;

(6) a midship section plan;

(7) a capacity plan showing the capacity and the vertical and longitudinal centers of gravity of each cargo space, tank, and similar space;

(8) tank sounding tables;

(9) draft mark locations;

(10) detailed plans of watertight doors; and

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Subpart C—Vessel Operation

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§ 157.27 Discharges: Tank vessels carrying oil exclusively on rivers, lakes, bays, sounds, and the Great Lakes, and seagoing tank vessels of less than 150 gross tons.

Unless a tank vessel carrying oil exclusively on rivers, lakes, bays, sounds, and the Great Lakes, or a seagoing tank vessel of less than 150 gross tons discharges clean ballast or segregated ballast, the vessel must—

(a) retain on board any oily mixture; or

(b) transfer an oily mixture to a reception facility.

§ 157.28 Discharges from tank barges exempted from certain design requirements.

The person in charge of a tank barge exempted under § 157.08(a)(2) from the requirements in §§ 157.11, 157.13, 157.15, and 157.23 shall ensure that while the barge is proceeding en route—

(a) cargo tanks are not ballasted or washed; and

(b) oil or oily mixtures are not discharged.

§ 157.29 Discharges: Seagoing tank vessels of 150 gross tons or more.

Unless a seagoing tank vessel of 150 gross tons or more discharges an oily mixture in compliance with the requirements in §§ 157.37, 157.39, or 157.43, the vessel must—

(a) retain the mixture; or

(b) transfer the mixture to a reception facility.

§ 157.31 Discharges: Chemical additives.

No person may use a chemical additive to circumvent the discharge requirements in §§ 157.27, 157.29, 157.37, 157.39, and 157.43.

§ 157.33 Water ballast in oil fuel tanks.

A new vessel may not carry ballast water in an oil fuel tank.

§ 157.35 Ballast added to cargo tanks.

A tank vessel that meets the design requirement in § 157.09 may carry water ballast in cargo tanks during abnormally severe weather conditions if more ballast water than can be carried in segregated ballast tanks is required for the safety of the vessel. This ballast water must be—

(a) processed and discharged in compliance with the requirements in § 157.37; and

(b) recorded in the Oil Record Book under § 151.35(c)(1)(vii) of this chapter.

§ 157.37 Discharge of cargo residue.

(a) Except as required in paragraph (b) of this section, a tank vessel may discharge into the sea an oily mixture from a cargo tank and cargo pump room bilge if the vessel—

(1) is more than 50 nautical miles from the nearest land;

(2) is proceeding en route;

(3) is discharging at an instantaneous rate of oil content not exceeding 60 liters per nautical mile;

(4) is an existing vessel and the total quantity of oil discharged into the sea does not exceed 1/15,000 of the total quantity of the cargo that the discharge formed a part, or is a new vessel and the total quantity of oil discharged into the sea does not exceed 1/30,000 of the total quantity of the cargo that the discharge formed a part;

(5) discharges above the waterline through the piping required in §157.11(a); and

(6) has in operation an automatic oil discharge monitoring and control system approved by the Coast Guard (specification regulation to be proposed), except that system may be operated manually if—

(i) the automatic system fails during a ballast voyage;

(ii) the failure is recorded in the Oil Record Book;

(iii) the master ensures that the discharge is constantly monitored visually and promptly terminated when oil is detected in the discharge; and

(iv) the system is operated manually only until the ballast voyage is completed.

(b) A tank vessel that carries asphalt exclusively must transfer cargo residues and tank washings to a reception facility.

§ 157.39 Machinery space bilges.

(a) A tank vessel may discharge an oily mixture from a machinery space bilge that is combined with an oil cargo mixture if the vessel discharges in compliance with § 157.37.

(b) A tank vessel may discharge an oily mixture from a machinery space bilge that is not combined with an oil cargo mixture if the vessel—

(1) is more than 12 nautical miles from the nearest land;

(2) is proceeding en route;

(3) is discharging an effluent with an oil content of less than 100 parts per million; and

(4) has in operation an oil discharge monitoring and control system approved by the Coast Guard (specification regulation to be proposed) and oil water separating equipment approved by the Coast Guard (specification regulation to be proposed).

§ 157.41 Emergencies.

Sections 157.27, 157.29, 157.37, and 157.39 do not apply to a tank vessel that discharges into the sea oil or oily mixtures—

(a) for the purpose of securing the safety of the vessel or for saving life at sea; or

(b) as a result of damage to the vessel or its equipment if—

(1) reasonable precautions are taken after the occurrence of the damage or discovery of the discharge for the purpose of preventing or minimizing the discharge; and

(2) the owner, master or person in charge did not intend to cause damage, or did not act recklessly and with knowledge that damage of the environment would probably result.

§ 157.43 Discharges: clean and segregated ballast.

(a) Clean ballast may be discharged in accordance with § 157.37(a)(6).

(b) The master of a vessel under this part shall ensure that segregated ballast is not discharged unless he finds no oily mixture in the ballast after—(1) visually examining the top of the ballast contents of each tank; or

(2) testing the ballast contents of each tank with an oil/water interface detector.

§ 157.45 Valves in cargo or ballast piping system.

When a tank vessel is at sea and the tanks contain oil, valves and closing devices in the cargo or ballast piping system or in the transfer system must be kept closed except they may be opened for cargo or ballast transfer to trim the vessel.

§ 157.47 Information for master.

A master or person in charge of a new vessel shall operate the vessel in accordance with the information required in 46 CFR 31.10-30(d) that includes the following:

(a) Stability information.

(b) Damage stability information determined in acordance with the criteria contained in Appendix B of this part.

(c) Loading and distribution of cargo information determined in compliance with the damage stability criteria required in Appendix B of this part.

§ 157.49 Instruction manual.

The master of a tank vessel shall ensure that the instruction manual under § 157.23 is available and used when the cargo or ballast systems are operated.

APPENDIX A—DAMAGE ASSUMPTIONS, HYPOTHETICAL OUTFLOWS, AND CARGO TANK SIZE AND ARRANGEMENTS

1. *Source.* The procedures for the damage assumption calculations contained in this Appendix conform to Regulations 22, 23, and 24 of Annex I of the International Convention for the Prevention of the Pollution from Ships, 1973, done at London, November 2, 1973.

2. *Assumptions.* For the purpose of calculating hypothetical outflow from tank vessels, three dimensions of the extent of damage of a parallelepiped on the side and bottom of the vessel are assumed.

(a) For side damage, the conditions are as follows:

Damage	*Conditions*
(1) Longitudinal extent l_c...	$\frac{1}{3}$ $L^{2/3}$ or 14.5 m, whichever is less.
(2) Transverse extent (t_c) (inboard from the vessel's side at right angles to the centerline at the level corresponding to the assigned summer freeboard).	$\frac{B}{5}$ or 11.5 m, whichever is less.
(3) Vertical extent (v_c).....	From the base line upwards without limit.

(b) For bottom damage, two conditions to be applied individually to the stated portions of the vessel, as follows:

Damage	Conditions	
	For 0.3L from the forward perpendicular of ship	Any other part of ship
(1) Longitudinal extent (l_s)	$\frac{L}{10}$	$\frac{L}{10}$ or 5 meters, whichever is less.
(2) Transverse extent (t_s)	$\frac{B}{6}$ or 10 meters, whichever is less but not less than 5 meters.	5 meters.
(3) Vertical extent from the base line (v_s).	$\frac{B}{15}$ or 6 meters, whichever is less	$\frac{B}{15}$ or 6 meters, whichever is less.

3. *Hypothetical Outflow of Oil.* (a) The hypothetical outflow of oil in the case of side damage (O_c) and bottom damage (O_s) is calculated by the following formula with respect to compartments breached by damage to all conceivable locations along the length of the vessel to the extent as defined in section 2 of this Appendix.

(1) For side damages: Formula I

$$O_c = \Sigma W_i + \Sigma K_i C_i$$

(2) For bottom damage: Formula II

$$O_s = \frac{1}{3}(\Sigma Z_i W_i + \Sigma Z_i C_i)$$

Where:

W_i = Volume of a wing tank assumed to be breached by the damage as specified in section 2 of this Appendix; W_i for a segregated ballast tank may be taken equal to zero;

C_i = Volume of a center tank assumed to be breached by the damage as specified in section 2 of this Appendix; C_i for a segregated ballast tank may be taken equal to zero;

$$K_i = 1 - \frac{b_i}{t_c}$$

when b_i is equal to or greater than t_c, K_i is equal to zero;

$$Z_i = 1 - \frac{h_i}{v_s}$$

when h_i is equal to or greater than v_s, Z_i is equal to zero;

b_i = Minimum width of wing tank under consideration measured inboard from the vessel's side at right angles to the centerline at the level corresponding to the assigned summer freeboard; and

h_i = Minimum depth of the double bottom under consideration; where no double bottom is fitted, h_i is equal to zero.

(b) If a void space or segregated ballast tank of a length less than l_c is located between wing oil tanks, O_c in formula I of this section may be calculated on the basis of volume W_i being the actual volume of one such tank (where they are of equal capacity) or the smaller of the two tanks (if they differ in capacity), adjacent to such space, multiplied by S_i as defined below and taking for all other wing tanks involved in such a collision the value of the actual full volume.

$$S_i = 1 - \frac{l_i}{l_c}$$

Where l_i = length of void space or segregated ballast tank under consideration.

(c) Credit is only given in respect to double bottom tanks which are either empty or carrying clean water when cargo is carried in the tanks above.

(1) If the double bottom does not extend for the full length and width of the tank involved, the double bottom is considered nonexistent and the volume of the tanks above the area of the bottom damage must be included in formula II of this section even if the tank is not considered breached because of the installation of such a partial double bottom.

(2) Suction wells may be neglected in the determination of the value h_i if such wells are not excessive in area and extend below the tank for a minimum distance and in no case more than half the height of the double bottom. If the depth of such a well exceeds half the height of the double bottom, h_i is taken equal to the double bottom height minus the well height.

(d) In the case where bottom damage simultaneously involves four center tanks, the value of O_s may be calculated according to formula III as follows:

$$O_s = \frac{1}{4}(\Sigma Z_i W_i + \Sigma Z_i C_i)$$

(e) Credit for reduced oil outflow from bottom damage may be applied to formula III for an installed emergency high suction cargo transfer system that—

(1) transfers within two hours oil equal to one half of the volume of the largest tank involved;

(2) has sufficient ballast or cargo tankage available to receive the transferred oil; and

(3) has the high suction piping installed at a height not less than the vertical extent of bottom damage (v_s).

4. *Allowable volumes of cargo tanks.*

(a) The allowable volume of a wing cargo tank (VOL_W) is equal to seventy-five percent of O_A. In a segregated ballast tank vessel VOL_W may equal O_A for a wing cargo oil tank located between two segregated ballast tanks each of length greater than l_c and width greater than t_c.

(b) The allowable volume of a center cargo tank (VOL_T) is 50,000 cubic meters.

5. *Allowable length of cargo tanks.* The allowable length of a cargo tank (L_a) is equal to the greater of 10 meters or more of the following values:

(a) If no longitudinal bulkhead is provided, 0.1L.

(b) If a longitudinal bulkhead is provided at the centerline only, 0.15L.

(c) If two or more longitudinal bulkheads are provided:

(1) For wing tanks, 0.2L; and

(2) For center tanks—

If

(I) $\frac{b_i}{B}$

is equal to or greater than $\frac{1}{5}$, 0.2L; or

If

(II) $\frac{b_i}{B}$

is less than $\frac{1}{5}$; and—

(A) no centerline longitudinal bulkhead is provided,

$$\left(0.5\frac{b_i}{B} + 0.1\right)L;$$

or

(B) a centerline longitudinal bulkhead is provided,

$$\left(0.25\,\frac{b_i}{B}+0.15\right)L.$$

Appendix B—Subdivision and Stability Assumptions

1. *Source.* The procedures for the loading assumption calculations contained in this Appendix conform to Regulation 25 of Annex I of the International Convention for the Prevention of the Pollution from Ships, 1973, done at London, November 2, 1973.

2. *Loading Assumptions.* For the purpose of calculating subdivision and damage stability for a tank vessel, the operating drafts must reflect actual partial or full load conditions consistent with trim and strength of the vessel. Ballast conditions need not be considered if the tank vessel is not carrying oil in cargo tanks excluding oily residues. Loading condition must reflect the specific gravities of the cargo.

3. *Damage Assumptions.*

(a) Damage is applied to all conceivable locations along the length of the vessel as follows:

(1) For a vessel of more than 225 meters in length, anywhere in the vessel's length.

(2) For a vessel of more than 150 meters, but not exceeding 225 meters in length, anywhere in the vessel's length except where the after or forward bulkhead bounding a machinery space located aft is involved in the damage assumption. The machinery space is calculated as a single floodable compartment.

(3) For a vessel 150 meters or less in length, anywhere in the vessel's length between adjacent transverse bulkheads except the machinery space.

(b) The extent and the character of the assumed side or bottom damage, as defined in section 2 of Appendix A of this part, must be applied except longitudinal bottom damage within 0.3L from the forward perpendicular must be assumed to be the same as that for side damage. If any damage of lesser extent results in a more severe condition, such damage must be assumed.

(c) If damage involves transverse bulkheads as specified in paragraphs (a)(1) and (2) of this section, transverse watertight bulkheads must be spaced at least at a distance equal to the longitudinal extent of the assumed damage specified in paragraph (b) of this section in order to be considered effective. Where transverse bulkheads are spaced at a lesser distance, one or more of these bulkheads within such extent of damage must be assumed as nonexistent for the purpose of determining flooded compartments.

(d) If the damages between adjacent transverse watertight bulkheads is within the definition contained in paragraph (a)(3) of this section, no main transverse bulkhead or a transverse bulkhead bounding side tanks or double bottom tanks is to be assumed damaged, unless—

(1) the spacing of the adjacent bulkheads is less than the longitudinal extent of assumed damage defined in paragraph (b) of this section; or

(2) there is a step or a recess in a transverse bulkhead of more than 3.05 meters in length, located within the extent of penetrations of assumed damage. The step formed by the after peak bulkhead and after peak tank top is not regarded as a step for these calculations.

(e) If pipes, ducts, or tunnels are situated within the assumed extent of damage, there must be arrangements so that progressive flooding may not thereby extend to compartments other than those assumed to be floodable for each case of damage.

4. *Characteristic and Condition Assumption for Calculations.*

(a) Account must be taken of any empty or partially filled tanks, the specific gravity of cargoes carried, and any outflow of liquids from damaged compartments.

(b) The permeabilities are assumed as follows:

Intended space use:	*Permeability*
Stores	0.60
Accommodation	0.95
Machinery	0.85
Voids	0.95
Consumable liquids	[1] 0 or 0.95
Other liquids	[2] 0 or 0.95

[1] Whichever results in the more severe requirements.

[2] The permeability of partially filled compartments must be consistent with actual density and the amount of liquid carried.

(c) The buoyancy of any superstructure directly above the side damage is to be disregarded. The unflooded parts of superstructures beyond the extent of damage may be taken into consideration if they are separated from the damaged space by watertight bulkheads and no progressive flooding of these intact spaces takes place. Class I doors are allowed in watertight bulkheads in the superstructure.

(d) The free surface effect is to be calculated—

(1) at an angle of heel of 5 degrees for each individual compartment; or

(2) by assessing the shift of liquids by moment of transference calculations.

(e) In calculating the effect of free surfaces of consumable liquids, it is to be assumed that, for each type of liquid, at least one transverse pair or a single centerline tank has a free surface and the tank or combination of tanks to be taken into account is to be those where the effect of free surface is the greatest.

(R.S. 4417a(3) and (7), as amended (46 U.S.C. 391a(3) and (7); 49 CFR 1.46(n)(4) (40 CFR 3906).

Effective date. These regulations shall become effective on October 14, 1975.

APPENDIX V - RULES AND REGULATIONS FOR THE PROTECTION OF THE MARINE ENVIRONMENT RELATING TO TANK VESSELS CARRYING OIL IN DOMESTIC TRADE

Title 33 - Navigation and Navigable Waters

CHAPTER I - COAST GUARD, DEPARTMENT OF TRANSPORTATION

(CGD 75-240)

PART 157 - RULES AND REGULATIONS FOR THE PROTECTION OF THE MARINE ENVIRONMENT RELATING TO TANK VESSELS CARRYING OIL IN DOMESTIC TRADE

Tank Vessels Carrying Oil in Trade

Purpose. The purpose of these amendments to the pollution regulations is to add design, equipment, and operation requirements for seagoing U. S. flag tank vessels of 150 gross tons or more engaged in foreign trade and for foreign flag tank vessels of 150 gross tons or more that enter the navigable waters of the United States.

Interested persons were given an opportunity to participate in the rule making by a notice that appeared in the April 15, 1976 issue of the FEDERAL REGISTER (41 FR 15859). In addition to receiving written comments on the proposed rules, a public hearing was held by the Coast Guard on May 20, 1976 to receive oral and written comments.

The public docket on the rule making contains correspondence from 12 commenters. Comments made at the public hearing and all written comments submitted to the Coast Guard were considered in promulgating these final rules.

A commenter who presented the views of 8 environmental groups recommended that the proposed discharge standards for U. S. vessels be enforced against foreign flag vessels on international waters and that violators of these standards be denied entry to U. S. ports. The commenter distinguishes between the U. S. unilaterally enforcing

subject any part of them to its sovereignty. Freedom of the high seas is exercised under the conditions laid down by these articles and by the other rules of international law. It comprises, inter alia, both for coastal and non-coastal States: (1) Freedom of navigation; (2) Freedom of fishing; (3) Freedom to lay submarine cables and pipelines; (4) Freedom to fly over the high seas. These freedoms, and others which are recognized by the general principles of international law, shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas."

It is a principle recognized by the Supreme Court in United States v. Louisiana et al (363 US 1, 33) - "the high seas, as distinguished from inland waters, are generally conceded by modern nations to be subject to the exclusive soverignty of no single nation."

This concept is expressed as follows in "The International Law of the Sea" by C. John Colombia (6th edition):

" 80. Right of regulation by the community of nations.

It results from the above considerations that the high sea cannot be under the sovereignty of any State and that no State has a right to exercise jurisdiction over it. The sea must remain common to all nations in order to fulfill its main mission of an international highway. It does not follow, however, that because no jurisdiction is enjoyed by any State on the high seas, that the community of nations is not entitled to provide, by international agreement, binding rules on the proper use of the sea to the greatest possible advantage of all States and also for the purpose of establishing a legal order in and over it. If this were not so, a state of anarchy and lawlessness would prevail on the open seas, not only rendering its use incapable of proper exploitation,

but endangering the lives and property of persons sailing in it. A right to regulate the open seas must therefore be recognized to the international community of nations ...."

It is the Coast Guard's opinion that this is a well established principle of international law, and the commenter's recommendation, since it ignores this principle, can not be accepted.

One commenter requested the proposed § 157.24(d)(3) be changed to allow the submission of hydrostatic tables. The commenter stated that instead of curves of form, which would be required under § 157.24(d)(3), he uses computed hydrostatic tables that contain accurate data for every inch of the draft. The Coast Guard finds this request reasonable and has changed § 157.24(d)(3) to include hydrostatic tables as an alternative to curves of form.

This commenter also suggested that tank capacity tables should be substituted for tank sounding tables in proposed § 157.24(d)(8). The commenter contends that tank sounding tables are not normally available before construction. Since the Coast Guard would accept tank sounding tables or tank capacity tables, § 157.24(d)(8) has been changed to allow submission of either table.

Commenters criticized the proposed requirements as attempting to introduce unilaterally, for foreign-flag vessels, detailed requirements "that exceed internationally-agreed standards". A commenter suggested that it could be counter productive to the objective of pollution avoidance to specify, "at this stage", the distribution of the segregated ballast. He also suggested that it is unreasonable to specify a 20% reduction in the maximum hypothetical outflow specified in the 1973 Convention.

The 1973 Convention requires parties to meet its standards. It does not prohibit more stringent standards, especially on issues for which no specifications are supplied. The distribution of segregated ballast spaces is considered by the Coast Guard as a logical and beneficial corollary to a segregated ballast capacity on new tank vessels. The Coast Guard's position on this issue was explained in the preamble in the April 15, 1976 notice of proposed rule making. The suggestion to withdraw this requirement is not accepted by the Coast Guard.

One of the commenters also criticized the ballast location proposal because "it appears to be of secondary value and to have been considered in relation to only a limited number of possible tanker designs or alternative measures." This commenter appears to have misunderstood the objective of the regulations, as stated in the preamble in the October 14, 1975 issue of the FEDERAL REGISTER. The primary purpose (or "value") of these regulations is to protect the marine environment by reducing operational pollution. A secondary purpose (or "value") of these regulations is, with the proper positioning of segregated ballast, to achieve a significant measure of additional protection, as a result of the extra cubic capacity that such ballast provides, over a range of accident circumstances. The study group report of April 28, 1975, has been included in the Final Environmental Impact Statement on Regulations for Tank Vessels Engaged in the Carriage of Oil in Domestic Trade. The study states the following:

"This study was necessarily carried out within a limited time frame. Every effort was made to include all of the creative thinking and analysis work that various industry and government groups had

already developed on this subject. The study group expressed a good deal of its own creative ability but the possibility remains that there are other design concepts which might exist and be found advantageous. The time limitations also forced the study group to do most of its evaluation on designs in the 120-250,000 dwt size range with lesser attention to ships up to 500,000 dwt. Different design alternatives might be more or less advantageous on ships which fall outside the 120-250,000 dwt size range. The study group also necessarily focused its attention on designs with conventional ratios of length to beam to depth. The same problems may apply with designs which are not conventional in this regard. The study group also recognizes that a correction factor to the formula may be necessary for ship sizes larger than those primarily studied. Time limitations again precluded particular consideration of this item. There is almost no quantitative data available which relates resulting internal structural integrity to the depth of accidental penetration. The study group used the same approach as in the IMCO hypothetical outflow regulation in regard to the point of penetration. While this is a simplified assumption, it should provide a relative measure of effectiveness for differing designs in accident circumstances."

Since the object of the study was to provide this measure, the Coast Guard considers the study results worthwhile. It is notable that in spite of wide discussion and publicity regarding the segregated ballast distribution concept, all commenters objected in principle rather than to the technical merits of the proposal.

A commenter has directed attention to what he considers inconsistencies in the effective dates of the proposed rules and the 1971 amendments to the International Convention for the Prevention of Pollution of the Sea by Oil (London, May 12, 1954) (12 UST 2989, TIAS 4900, 327 UNTS 3). He suggested that the Coast Guard should deal sympathetically with any problems that might arise over these differences in dates. The effective dates in the proposed regulations are consistent with the 1971 amendment dates. The Coast Guard expects that almost all affected vessels will be in compliance by the time the regulations are effective, since builders and owners are aware of the calendar dates in the 1971 amendments. The Coast Guard does not expect the problems anticipated by the commenter to arise.

A commenter suggested that the Coast Guard should have the discretion to accept existing vessels with "purpose-built" slop tanks of slightly lower than 3% of oil carrying capacity. Proposed § 157.15, to which the comment is directed, would not become effective for an existing foreign or domestic vessel until December 31, 1979. Only nonsegregated ballast tank vessels or tank vessels that have tank eductors installed must have a slop tank capacity of 3% or more of the oil carrying capacity of the vessel. Other tank vessels with slop tanks meeting § 157.15 must have a 2% or more capacity. In either case, if it can be established that the vessel's tank capacity does not meet § 157.15 but can satisfy the equivalence requirements under § 157.07, the Coast Guard will accept that vessel.

Commenters suggested that the requirements for rerouting piping systems be eliminated in proposed § 157.11 because the rearrangements will not in themselves effect a significant reduction in oil discharge

during normal tanker operations and is unjustified on grounds of cost-effectiveness, especially in older vessels. Before making the proposal, the Coast Guard studied this issue and determined that the the proposed resolution is technically desirable and economically feasible. Section 157.11 requires the fixed piping system to discharge to the sea from above the weather deck or the side above the waterline of the deepest ballast condition. The same pumps capable of pumping cargo to deck level and then ashore are capable of pumping oil mixtures over the side, as required, without rearrangement. Accordingly, the Coast Guard did not accept this suggestion.

Commenters criticized proposed § 157.24 because it implies that the Coast Guard has a legitimate interest in the plans for a foreign vessel that may never approach the U. S. The Coast Guard agrees with this criticism. The proposed requirement did not clearly state the intent of the Coast Guard; therefore, § 157.24 has been changed. The words "before construction of the vessel" have been changed to "before that vessel enters the navigable waters of the United States".

A commenter stated that proposed § 157.43(a), which applies to foreign vessels in U.S. waters, refers to § 157.37, which does not apply to foreign vessels. The Coast Guard agrees with the comment that the two requirements conflict. For clarification, § 157.25(a) has been changed by adding § 157.37(a)(6) to the list of requirements that apply to foreign vessels when they discharge into the navigable waters of the United States. In addition, § 157.25(b) has been changed to exclude § 157.37(a)(6) from the list of requirements that do not apply to foreign vessels.

A commenter stated that the requirement for an automatic oil discharge monitoring and control system, as a condition for the discharge of clean ballast, is unrealistic since the degree of accuracy needed is not yet available at this stage of that device's development. The Coast Guard is aware of the problem and will not enforce the requirement until a specification regulation for the device is published in the FEDERAL REGISTER, after the public participates in the rule making procedure. The Coast Guard anticipates publishing a proposed specification within the next 6 months.

Commenters stated that it is unclear whether or not the proposed requirements apply to foreign vessels trading to or from U. S. ports, entering internal waters, or exercising the right of innocent passage through the territorial waters of the United States. The language, with which the commenters have difficulty, is taken from the law under which the regulations are proposed, Title II of the Ports and Waterways Safety Act of 1972, as amended, 46 U.S.C. 391a. That language is as follows:

"All vessels, regardless of tonnage, size, or manner of propulsion, and whether self-propelled or not, and whether carrying freight or passengers for hire or not, which are documented under the laws of the United States or enter the navigable waters of the United States except public vessels other than those engaged in commercial service, that shall have on board liquid cargo in bulk....." (underscoring supplied)

There was nothing in the regulations, nor in the Coast Guard's intent in proposing the regulations, to contravene the intentional law principle of innocent passage. However, since the regulations appear to lack clarity in this respect, § 157.01(a)(2) is changed by adding the words "to engage in commercial service" after the words "United States."

Although deepwater ports probably can not be legally considered "navigable waters of the U.S.", the possibility exists that vessels that call at these ports may become subject to these and other regulations by virtue of a broad interpretation of section 19 of the Deepwater Ports Act of 1974 (Pub. Law 93-627, 88 Stat. 2126, 33 U.S.C. 1501) or by the action of the licensee of the port as a condition of operation.

A commenter suggested that the proposed distribution of ballast exceeds the coastal state powers to be agreed upon by the Law of the Sea Conference. Also, this commenter states that the proposed dates used for new vessels, that anticipate the 1973 Convention, is outside the interpretation of international agreement as conceived in the Law of the Sea discussion. Since the Law of the Sea is only in the drafting stage, it can have no impact, at this time, on the proposed regulations. Nevertheless, it should be pointed out to the commenter that the powers exercised under these regulations are those of a port state and not a coastal state.

A commenter recommended that the Coast Guard consider modifying the requirements of the proposed regulations for U. S. tank vessels operating from foreign port to foreign port. It is this commenter's view that if these U. S. tank vessels are required to comply with the regulations, they would be placed at a competitive disadvantage with respect to their foreign counterparts. Subsection 7(D) of the Ports and Waterways Safety Act of 1972 specifies that any rule or regulation for the protection of the marine environment promulgated pursuant to subsection (7) must be equally applicable to U. S. flag vessels engaged in foreign trade and to

foreign flag vessels entering the navigable waters of the United States. Since there is no provision in the Act authorizing any distinction in treatment between U. S. vessels engaged in foreign trade and U. S. vessels engaged in the domestic trade, nor any provision authorizing any distinction in treatment between U.S. vessels, the Coast Guard can not accept this recommendation.

A commenter suggested that proposed § 157.21 should apply to new foreign flag tank vessels as well as new U. S. flag vessels. He bases his suggestion in the following:

1. Section 157.21 and the two compartment standards of subdivision in the 1973 Convention indicate that the requirements in the International Convention on Load Lines, 1966 (18 UST 1857, TIAS 6331, 640 UNTS 133) (1966 Convention) are not adequate to prevent the total loss of a vessel from a casualty and a subsequent massive oil spill.

2. Because of the stringency of § 157.21 and its unilateral application, foreign flag tankers would have a competitive advantage over U. S. flag tankers.

Since the subdivision and stability requirements in the 1973 Convention will supersede the subdivision and stability requirements in the 1966 Convention, other signatory countries will follow the United States lead in applying the more stringent requirements to their flag vessels. The only difference between proposed § 157.21 and the 1966 Convention is the subdivision and stability requirements for vessels while in a partially loaded condition. The Coast Guard considers that any foreign flag tank vessel that meets the requirements in the 1966 Convention would attain an equivalent level of safety to the requirements in § 157.21. Acknowledging that a small competitive advantage may accrue to foreign tankers the Coast Guard, balancing the advantages and

through increased transportation costs over the remaining life of a tanker. The cost from constructing new vessels under these regulations is estimated to be 44 to 60 million dollars over a period of 20 years.

These requirements are necessary to bring the vessels to which they apply into compliance with requirements already applicable to U.S. tank vessels in domestic trade. The benefits of these requirements are to reduce the influx of oil into the marine environment from the normal deballasting and tank cleaning operation of tank vessels and also to reduce the outflow of oil in event of hull breaching accidents suffered by tank vessels.

In consideration of the foregoing, the amendments proposed in the April 15, 1976 issue of the FEDERAL REGISTER (41 FR 15859) are hereby adopted subject to the changes as discussed in the preceding paragraphs.

In consideration of the foregoing, Part 157 of Title 33, Code of Federal Regulations, is amended as follows:

1. The title of Part 157 is revised to read as follows:

"Rules for the Protection of the Marine Environment Relating to Tank Vessels Carrying Oil in Bulk."

2. Section 157.01 is revised and a note is added to follow § 157.01 to read as follows:

§ 157.01 Applicability.

(a) This part prescribes design, equipment, and operation requirements for tank vessels of 150 gross tons or more carrying oil in bulk that -

(1) are documented under the laws of the United States (U. S. vessels); or

(2) are not U. S. vessels and enter the navigable waters of the United States to engage in commercial service (foreign vessels).

9. The introductory text of § 157.21 is revised to read as follows:

§ 157.21 Subdivision and stability.

A new vessel that is a U. S. vessel must meet the following subdivision and damage stability criteria after assuming side and bottom damages, as defined in Appendix B of this Part. A U.S. vessel that meets the requirements in this section is considered by the Coast Guard as meeting 46 CFR 42.20-5.

* * * * *

10. Section 157.24 is amended by revising the introductory text and paragraphs (a), (b), and (d) to read as follows:

§ 157.24 Submission of calculations, plans, and specifications.

The owner, builder, or designer of a new vessel shall submit the following to the Coast Guard before that vessel enters the navigable waters of the United States:

(a) Calculations to substantiate compliance with the tank arrangement and size requirements under § 157.19, or a letter from the government of the vessel's flag state that certifies compliance with -

(1) Section 157.19; or

(2) Regulations 24 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973.

(b) Except for a new vessel that is a foreign vessel, calculations to substantiate compliance with subdivisions and damage stability requirements under § 157.21.

* * * * *

(d) Plans and specifications for the vessel that include -

(1) design characteristics;

(2) a lines plan;

(3) curves of form (hydrostatic curves) or hydrostatic tables;

(4) a general arrangement plan of each deck and level;

(5) inboard and outboard profile plans showing oiltight and watertight bulkheads;

(6) a midship section plan;

(7) a capacity plan showing the capacity and the vertical and longitudinal centers of gravity of each cargo space, tank, and similar space;

(8) tank sounding tables or tank capacity tables;

(9) draft mark locations;

(10) detailed plans of watertight doors; and

(11) detailed plans of vents.

11. Section 157.25 is revised to read as follows:

§ 157.25 Exceptions to applicability.

(a) Sections 157.29, 157.31, 157.37(a)(6), and 157.43 apply to foreign vessels when they discharge into the navigable waters of the United States.

(b) Sections 157.35, 157.37, except paragraph (a)(6), 157.39, 157.45, and 157.47 do not apply to foreign vessels.

12. Section 157.43 is revised to read as follows:

§ 157.43 Discharges: clean and segregated ballast.

(a) Clean ballast may be discharged in accordance with § 157.37 (a)(6).

(b) The master of a vessel under this part shall ensure that segregated ballast is not discharged unless he finds no oily mixture in the ballast after -

(1) visually examining the top of the ballast contents of each tank; or

(2) testing the ballast contents of each tank with an oil/water interface detector.

13. The introductory text of § 157.47 is revised to read as follows:

§ 157.47 Information for master.

The master or person in charge of a new vessel shall operate the vessel in accordance with the information required in 46 CFR 31.10-30(d) that includes the following:

* * * * *

(R.S. 4417a (3) and (7), as amended (46 U.S.C. 391a (3) and (7)); 49 CFR 1.46(n)(4)).

Effective date: These amendments shall become effective on

except as follows:

1. Sections 157.11, 157.15, 157.17(a) and (b) are effective on December 30, 1977 for an existing vessel that is a U. S. vessel in domestic trade and on December 30, 1979 for an existing vessel that is a foreign vessel or a U.S. vessel in foreign trade.

2. Section 157.19(a)(2) is effective on December 30, 1976 for each U.S. tank vessel that is delivered before January 1, 1977, for which the building contract is awarded after January 1, 1972, or, if there is no building contract, the keel is laid or the vessel is at a similar stage of construction after June 30, 1972, except those vessels constructed under a contract awarded before January 1, 1974 that do not carry crude oil, fuel oil, heavy diesel oil, or lubricating oil.

3. Section 157.19(a)(3) is effective on June 29, 1978 for each foreign tank vessel that is delivered before January 1, 1977, for which the building contract is awarded after January 1, 1974, or if there is no building contract, the keel is laid or the vessel is at a similar stage of construction after June 30, 1974.

Dated:

APPENDIX VI - CARRIAGE OF BULK DANGEROUS OR EXTREMELY FLAMMABLE LIQUID CARGOES
(41 FR 26126-26145)

federal register

THURSDAY, JUNE 24, 1976

PART II:

DEPARTMENT OF TRANSPORTATION

Coast Guard

■

CARRIAGE OF BULK DANGEROUS OR EXTREMELY FLAMMABLE LIQUID CARGOES

Proposed Safety Standards for Self Propelled Vessels

DEPARTMENT OF TRANSPORTATION

Coast Guard

[46 CFR Parts 1, 2, 24, 30, 31, 32, 39, 40, 42, 70, 90, 98, 110, 151, 153]

CARRIAGE OF BULK DANGEROUS OR EXTREMELY FLAMMABLE LIQUID CARGOES

Proposed Safety Standards for Self Propelled Vessels

The Coast Guard, acting under the authority of the Dangerous Cargo Act (46 U.S.C. 170), and the Ports and Waterways Safety Act (46 U.S.C. 391a), intends to issue regulations governing the design construction, and operation of all self-propelled U.S. flag vessels engaged in the carriage of certain bulk dangerous cargoes. The regulations would also apply to foreign flag vessels carrying certain bulk dangerous cargoes in U.S. navigable waters.

Interested persons are invited to participate in this proposed rulemaking by submitting written data, views, or arguments to the Executive Secretary, Marine Safety Council (G-CMC/81), Room 8117, 400 Seventh Street, SW. Washington, D.C. 20590. (Telephone 202-426-1477). Each person submitting comments should include his name and address, identify the notice (CGD 73-96), and give reasons for any recommendations. Comments received will be available for examination by interested persons in Room 8117, Department of Transportation, Nassif Building, 400 Seventh Street, SW, Washington, D.C. Copies will be furnished upon paymont of fees prescribed in 49 CFR 7.81.

The Coast Guard will hold a hearing on August 3, 1976, at 0930 A.M. in Conference Room 2232, Department of Transportation, Nassif Building, 400 Seventh Street, SW, Washington, D.C. Interested persons are invited to attend the hearing and present oral or written statements on this proposal. It is requested that anyone desiring to attend the hearing notify the Executive Secretary of the time needed for his presentation at least ten days in adanvce. Written summaries or copies of oral presentations are encouraged.

All communications received before August 20, 1976, will be evaluated before final action is taken on this proposal. The proposed regulations may be changed in the light of comments received.

The proposed regulations contain the vessel design, construction, and operating requirements for carriage of specific liquid cargoes aboard self-propelled vessels. The part, which would be an addition to Subchapter O of 46 CFR (presently limited to barges), would cover certain foreign and U.S. flag vessels, existing and new vessels. In examining the need for these proposals, the Coast Guard has considered its experience with the regulation of these cargoes aboard tank barges, certain of these cargoes aboard foreign and domestic vessels, and in the examination of accidents related to the transportation of these cargoes.

The Coast Guard has long administered regulations for the transportation of such dangerous cargoes in small packages but in most cases has controlled bulk shipments of these cargoes on a case by case basis. However, the frequency of bulk movement and the amount of cargo transported in bulk increased in the 1960's to a considerable extent. Complete regulations for bulk transportation of dangerous liquid and gas cargoes by barges were published in 1969. Similar regulations for self-propelled vessels were not undertaken because the trade was in an emergent state and because the vessels involved were largely foreign registry. The Coast Guard, while conducting a program of control of these ships through the Letter of Compliance technical review, perceived a need to seek development of international standards through the Inter-governmental Maritime Consultative Organization (IMCO). International recommendations covering the transportation of many of these cargoes on self-propelled vessels were undertaken by IMCO in 1967 as a result of this initiative. Since the number of self-propelled vessels transporting these cargoes in U.S. waters was relatively small, the Coast Guard decided to continue with the existing rules for self-propelled vessels while participating in preparation of the IMCO recommendations.

IMCO completed recommendations on bulk liquid cargoes in 1971; this proposal contains essentially all of the IMCO recommendations for these cargoes and, following IMCO's organization, does not include the liquefied gas cargoes which will be treated in a separate rule. The proposal exceeds the IMCO recommendations by requiring a warning sign (§ 153.952), by requiring a sampling arrangement on tanks carrying cargoes that must have closed gauges, by requiring a pumproom bilge alarm, by prohibiting the carriage of nitropropane in deck tanks, and by placing the following specific requirements on the cargoes named, all of which have been proposed to IMCO for inclusion in the Chemical Code:

Chemical	IMCO	46 CFR—	Supporting data
Acetone cyanohydrin		153.316—Increased pump-room ventilation.	This product is highly toxic by inhalation. The LC_{50} for rats is approximately 62 p/m (1 h).
Ammonium hydroxide (28 pct or less NH_3).		153.236 (e), (f)—materials of construction.	Ammonium hydroxide solution is corrosive to zinc, galvanized steel, and silver.
Butyl methacrylate.	Type D fire protection.	Type B or D fire protection.	B type fire protection was added. Since this product is not soluble in water, regular foam should be an effective firefighting agent.
Carbon disulphide		153.236 (e)—Materials of construction.	A mixture of zinc and carbon disulphide may react with incandescence.
Carbon tetrachloride.	Restricted gaging.	153.408—Overfill protection (Closed gaging).	The inhalation health hazard for carbon tetrachloride is high for both acute and chronic exposures. Narcosis with subsequent liver and kidney injury and death may occur as the result of an acute overexposure. Carbon tetrachloride is volatile (115 mm/hg at 25° C) and has poor warning properties. The odor is usually not objectionable at acutely toxic levels.
Dibutyl amine		153.236 (e)—Materials of construction.	The use of zinc is prohibited with every other amine and alcohol amine in the code because of corrosion problems. Although specific corrosion data are not available, this product is a typical amine.
1,3-dichloropropene.	Restricted gaging.	Closed gaging	This product causes severe irritation when inhaled. There is a possibility of liver or kidney damage from acute inhalation exposure.
Dimethyl formamide.	Type B fire protection.	Type A fire protection.	Dimethyl formamide is soluble in water. For water soluble products alcohol foam (type A) is recommended.
		153.236(b)—Materials of construction.	This product is corrosive to copper and its alloys.
Epichlorohydrin		153.316—Increased pumproom ventilation.	Epichlorohydrin presents a high hazard for both acute and chronic vapor exposures. The vapors are highly irritating to the mucous membranes of the eyes and respiratory tract. Pulmonary edema and renal damage may occur. Deaths occurred among guinea pigs, rats, and rabbits inhaling 500 p/m for 4 h. The product has a significant vapor pressure (12 mm/hg at 25° C).
Ethylene chlorohydrin.	Restricted gaging.	Closed gaging (153.316—Increased pumproom ventilation).	The vapors of this chemical are highly toxic. There is little margin of safety between early reversible symptoms and fatal intoxication. Absorption by any route, including the skin, may lead to severe illness or death. Symptoms which may result from breathing high concentrations of the vapor are headaches, severe thirst, delirium, collapse, shock, and coma. 250 p/m are lethal to rats in 4 h. The threshold limit value (TLV) for ethylene chlorohydrin is being changed from 5 p/m to C (ceiling) 1 p/m.
Ethylene dibromide.	Type C or D fire protection.	Type A, C, or D fire protection.	Because this product is soluble in water, alcohol foam (type A) should be an effective firefighting agent.
	Restricted gaging.	Closed gaging 153.408—Overfill protection).	The inhalation hazard for an acute exposure is high. The LC_{50} for rats (1 h) is 630 p/m. Ethylene dibromide causes irritation of all exposed tissues (respiratory tract, skin, and eyes. Death can occur from skin absorption. The derma LD_{50} for rabbits is approximately 300 mg/kg.
2-methyl-5-ethyl pyridine.	Type B fire protection.	Type A fire protection.	For water soluble products, alcohol foam (type A is recommended.
(Alpha-)methyl styrene.	Type A or D fire protection.	Type B or D fire protection.	For products not soluble in water, regular foam (type B) is recommended.
		153.912(a)—Inhibition.	It is necessary to inhibit this monomer for safe shipment.

Chemical	IMCO	46 CFR—	Supporting data
Morpholine	Open gaging	Restricted gaging	Morpholine is irritating to the respiratory tract, eyes, and nose.
Naphthalene	Type A, C, or D fire protection.	Type B, C, or D fire protection.	For products not soluble in water, regular foam (type B) is recommended.
(Mono-) nitrobenzene.	do	do	Do.
Oleum	4 m vent height	B/3 vent height	Oleum fumes spontaneously in air-forming mists of sulfuric acid and sulfur trioxide. These products cause severe local burning of nose and air passages. The vapor pressure at 20° C can vary between 1 and 190 mm/hg depending on the concentration.
Propionic acid	Open gaging	Restricted gaging	Inhaling the vapors of propionic acid will cause moderate to severe irritation. These effects are similar to those resulting from breathing acetic acid vapors.
Tetrahydrofuran		153.912(b)—stabilization.	In common with other ether solvents, unstabilized tetrahydrofuran slowly forms an organic peroxide when exposed to air. Stabilization of this product will prevent peroxide accumulation and minimize the possibility of decomposition reactions.
Toluene diisocyanate.		153.316—Increased pumproom ventilation.	The acute inhalation toxicity of toluene diisocyanate is severe. Asthmatic attack with chest pain and severe coughing result from breathing high concentrations. Sensitization has occurred in a number of instances after exposure to the vapors. Subsequent exposure to even very low concentrations may then result in effects more severe than those observed after an initial exposure. The threshold limit value (TLV) for toluene diisocyanate is C (ceiling) 0.02 p/m.
Tricresyl phosphate (containing 1 pct or more of the ortho- isomer).		153.525(a)—Usually toxic cargoes.	Several poisoning epidemics have occurred because of contamination of the meta- and para-isomers of tricresyl phosphate by the much more toxic ortho-isomer. Ingestion of small amounts of tri-orthocresyl phosphate causes, after a latent period of 5 to 28 d, sharp, cramplike pains in the calve and numbness in the hands and feet. Increasing weakness of the legs and feet follow and there may be progression involving the fingers or wrists. Extent to which the paralysis will be permanent appears to depend on the quantities taken in over a short period, rather than being the result of a cumulative effect from the intake of small quantities over long periods. The minimum paralytic dose in man is not known, but estimated to be between 10 and 30 mg/kg for adults. This range of values indicates that even very low levels will produce serious toxic effects.
Vinyl toluene	Type A fire protection.	Type B fire protection.	For products not soluble in water, regular foam (type B) is recommended.

To further ensure the practicality of the proposals, the Coast Guard asked the assistance of a SOLAS subcommittee and the Chemical Transportation Industry Advisory Committee (CTIAC), formerly the Chemical Transportation Advisory panel (CTAP). The CTIAC formed a task group that has participated in the development of these proposed regulations since August 1968. The Coast Guard believes these proposals are technologically and economically feasible. They are patterned after internationally developed standards in which many nations with large shipping interests have participated, and they are similar to the (1971) recommendations of the CTIAC.

The proposed rules apply to a "tankship", defined as a self-propelled vessel having on board a permanently affixed tank containing any quantity of one of the cargoes listed in the part. Thus, a vessel must meet these requirements unless her cargo tanks have been cleaned and freed of any listed cargo. (Vessels other than traditional tankers are included under these regulations. A conventional dry cargo ship, for example, would have to meet the hull type and cargo tank requirements if she wanted to carry a cargo in her deep tanks.)

The requirements for foreign flag vessels differ slightly from those for U.S. flag. A footnote to § 153.9 says that an IMCO Certificate of Fitness (issued under the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk) is generally sufficient basis for the Coast Guard to endorse a Letter of Compliance with the cargoes on the Certificate. The Coast Guard intends to accept an IMCO Certificate except in cases such as the following:

(a) When the Certificate authorizes a cargo that is not permitted to be shipped in U.S. waters, such as with beta-propiolactone, a suspected carcinogen not generally shipped in large quantities.

(b) When the Certificate is in error or requirements of the Code have been waived by the issuing administration, for example, if isopropylamine were authorized for a tank that did not have either pressure containment or refrigeration equipment; or

(c) When the regulations in the part exceed those in the Code, for example, where the Coast Guard would require that heating coils to tanks containing nitropropane be disconnected.

Data collected between 1969 and 1973 indicate that, worldwide, tankers carrying oil were involved in 162 groundings and 210 collisions, with the subsequent release of an estimated 400,000 long tons of cargo. Many cargoes listed in Table I are presently carried in conventional oil tankers. Because of the hazards of the listed cargoes, many of them should be transported only in vessels even more able to retain them following an accident than those generally used for the transportation of oil, and in all cases should be handled using equipment specifically designed to minimize their hazards.

To ensure a consistent evaluation of the relative hazard posed by each of the hundreds of cargoes shipped in bulk, the Coast Guard established a Cargo Hazard Evaluation Panel under the National Academy of Sciences. This panel has evaluated each of the cargoes contained in this proposal as well as many others not mentioned. Those cargoes proposed to be regulated herein were shown by the panel's evaluation to require particular attention if they are to be safely moved in bulk. The Coast Guard believes that an uncontrolled release of a listed cargo would pose a significant safety hazard to the vessel's crew, to the vessel itself, to the terminal facilities engaged in transferring the cargo, and to the population surrounding the ports and waterways through which the vessel moves because of the cargo's unusual flammability, toxicity, corrosiveness, reactivity, oxidizing potential, instability, or a combination of these properties. Since all cargoes do not have equally grave hazards, the cargoes are divided into three classes, each of which is assigned minimum containment system standards. The most hazardous cargoes are required to be transported in a type I containment system, those of least hazard in a type III containment system, and those of intermediate hazard in a type II containment system.

It is the intent of these regulations that the hazard in shipping each cargo be reduced to an acceptable level by designing and operating each cargo's containment system in a way that reduces the possibility of an uncontrolled release and limits the extent of any such release. Uncontrolled release of a cargo in either the liquid or vapor phase may result from collision, grounding, venting, leak or rupture of tanks or piping, fire, explosion, equipment failure, or personnel error. To minimize the possibility of such release, the rule proposes standards for hull and tank construction, vessel arrangement, piping, valving, gauging and venting, temperature and pressure control systems, testing and inspection, cargo transfer operations, and maintenance that are briefly summarized in table I, the Table of Minimum Requirements.

In developing standards for these containment systems, the Coast Guard's first goal was to minimize the chance of a vessel's sinking after a collision or grounding, a circumstance that may result in the eventual release of all her cargo. Under the provisions of the rule, each vessel must be able to survive a specified amount of damage anywhere in her cargo and ballast spaces. The vessels are then divided into "hull type" categories according to the extent of flooding, whether by external injury or by internal breach of piping, that each must withstand in way of her machinery space and remain afloat in stable equilibrium.[1]

[1] It is noted that there is a potential disparity in the requirements for damage to machinery space bulkheads for type III ships over 125 m. The proposed rule, in § 153.22 (b), and the IMCO Chemical Code do not require that damage to transverse bulkheads bounding an aft machinery space be considered. The 1973 Marine Pollution Convention, were it ratified, would require such damage to be considered on all tankers of more than 225 m. This apparent conflict is being evaluated by the Coast Guard and by IMCO.

In all cases, the parameters chosen to define the extent of damage and the criteria for surviving it are those recommended by IMCO, which analyzed accident data to determine mean damage dimensions and distribution of the point of contact for two vessels in collision. The hull category providing the greatest protection against sinking is called the type I hull, the least protection the type III hull, while the type II hull is intermediate. The standards for a containment system require that it be carried in a hull whose numerical type designation is the same or lower than the numerical type designation of the containment system: for example, a type II containment system may be carried in either a type II or a type I hull, but not in a type III hull.

Since cargo may be lost from a vessel that is damaged but does not sink, a hull type is insufficient to fully anticipate the problems that may arise in a collision. To more completely control the probability of a cargo release, one must control how close to the vessel's shell a cargo containment system may be placed (affecting the probability that the system would be damaged in an accident) and the amount of cargo in the containment system's cargo tank (affecting the amount of cargo that would be released if a system were damaged). The proposed standards covering these areas are those recommended by IMCO and are related to the statistically derived damage penetrations used by that organization in defining hull types. The components of a type I containment system must lie beyond the collision and grounding penetrations assumed in defining hull types, while the amount of cargo loaded into a tank may not exceed 1250 m^3. The components of a type II containment system must lie beyond the assumed grounding penetration and must be inboard of the hull at least 760 mm, while the amount of cargo loaded into a tank may not exceed 3000 m^3. The type III containment system may be adjacent to the hull and has no defined cargo quantity limit, although the type III hull requirements tend to limit any one tank's capacity.

Thus, the IMCO document recognizes four categories of bulk liquid cargoes. One category may be described as "cargoes to which the code does not apply", i.e. those liquids that do not fall within the definition of "bulk dangerous chemicals". "Bulk dangerous chemicals" may be loosely defined as products having hazards in addition to, or other than, those associated with normal petroleum products. The "cargoes to which the code does not apply" do not have to be carried in a chemical tanker and are not subject to this proposal. The other three categories are related to the hull types. Cargoes required to be carried in Type III ships are products for which the risk level is analogous to normal petroleum products but of a different nature. They are not required to be carried in tanks separated from the hull. The other two categories are cargoes that are required to be carried in tanks separated from the hull because of the potential hazard they present to the safety of the crew, the vessel and people in the surrounding area. These cargoes include water reactive cargoes, cargoes that become more corrosive in the presence of water, cargoes with high toxicity to humans, cargoes with unusual flammability characteristics, and other properties that make their potential release a serious safety risk. Tank separation from the hull does not necessarily mean double hull protection, although that is a method of meeting the requirement. Type III cargoes or "cargoes to which the code does not apply" can be carried in outboard tanks.

Products in all four categories may pose potential pollution threats; however, the polluting nature of the products, for the purposes of IMCO Resolution A 212 (VII) and this proposal, was not directly considered when placing the product in a category. In the future, IMCO will be revising the criteria for categorization of these cargoes with pollution of the marine environment in mind. In addition, the EPA list of hazardous polluting substances may cause the Coast Guard to reevaluate these products on the basis of their pollution potential. In this proposal, however, the requirement for tanks in Types I and II ships to be located certain distances from the hull, is promulgated for the safety of the vessel, ship personnel, ports, and the surrounding inhabitants.

The proposal contains several requirements to protect the crew from contaminated ballast and from exposure to cargo vapors drifting from the deck area. The cargo containment systems of new vessels would have to be located forward of all accommodation spaces; tanks beneath or aft of a deckhouse would not be endorsed to carry any of the listed cargoes. Portlights in the forward part of the deckhouse superstructure would have to be of the fixed type. Windows and doors in the forward part of the deckhouse would have to seal hosetight when closed. Ballast piping serving a dedicated ballast tank adjacent to a cargo tank could not enter an accommodation space or engine room.

Tank construction, piping and valving standards proposed are, in general, the same as existing standards for tank ships contained in Parts 32, 54, and 56 of Title 46, Code of Federal Regulations.

Proposed regulations for vent systems are substantially different from those that apply to conventional tank ships but are in agreement with IMCO standards. To protect people from toxic vapors and to direct flammable vapors to the atmosphere at safe distances from sources of ignition, a minimum vent height of either 4 meters or of one-third the vessel's beam is included most cargoes, the minimum height depending on the degree of hazard the cargo vapor has. To prevent toxic or explosive concentrations of cargo vapor from accumulating in enclosed spaces, any vent system discharge must be at least 10 meters from air intakes or openings in accommodations or service spaces.

Since certain enclosed spaces, such as cargo pumprooms and rooms containing cargo valves, are routinely exposed to cargo that may leak from seals and packing, they must have forced ventilation to prevent toxic or flammable vapor accumulation. Ventilation machinery must change the air in a space at least 30 times per hour, exhaust to a safe location, and avoid the recycling of exhausted vapors. Pumprooms handling certain toxic cargoes noted in table I must have ventilation rates of 45 changes per hour.

Because the crew enters them frequently, cargo pumprooms must have remotely controlled bilge systems so that cargo leakage can be pumped out safely. Furthermore, each pumproom must have an access way from the weatherdeck of sufficient size to permit a man wearing an air breathing apparatus to enter and remove an unconscious person.

Table I prescribes either a closed, restricted, or an open gauging system according to how harmful to the gauger exposure to the cargo may be. Both closed and restricted gauging systems include a requirement for a sampling arrangement that limits exposure of the persons taking the samples of the cargo. Restricted gauges, such as sounding tubes, may be installed on any cargo tank but may not be used if the cargo in the tank requires a closed gauging system. Other provisions included with the gauging system requirements prescribe the percentage of tank capacity that closed and restricted gauges must read and overfill alarms for closed gauging systems. Spill valves may be used to prevent a tank's rupture in overfill, but each valve must have a receiving container of at least 0.6 m^3 (approx. 4 barrels) capacity.

Pressure-vacuum relief valves, as well as their relieving pressures, are specified for many cargoes. The minimum relieving pressure, called the relief valve setting, for a tank containing a cargo at ambient temperature that requires a pressure relief valve is specified to be the cargo's vapor pressure at 46° C (approx. 115° F). A refrigerated tank's relief valve setting must at least equal 110% of the cargo's vapor pressure at the equilibrium temperature reached by the cargo with both the refrigeration equipment and the tank operating in ambient conditions of 46° C still air and 32° C (approx. 90° F) still water.

Vapor return connections are required for cargoes whose vapor pressures at 37.8° C (approx. 100° F) exceed one atmosphere, for those cargoes requiring a closed gauging system, and for cargoes having unusually severe toxicity.

A filling line may terminate no more than 100 mm above the bottom surface of the cargo tank to reduce the splashing that increases vapor evolution and the rate of static charge generation.

The requirements applying to emergency shutdown stations are intended to ensure that one could reach a station and stop cargo transfer in the event a cargo hose broke, pouring cargo in the

area of the hose connection. Thus one station would likely be forward of the hose connecting point, the other aft.

Many of the cargoes that would be regulated under the proposal require special containment systems, such as ones having temperature control, tank insulation, inert gas padding, or tank lining, or require special treatment such as chemical inhibition. A special requirement of this sort would be mandatory when the "special requirements" column of table I refers to the section containing the requirement.

One of the most critical times in the transportation of hazardous materials is the transfer of cargo from ship to terminal or vice-versa. A great potential for disaster exists during this operation because of the proximity of the vessel to people and property. Additionally, the very act of moving the cargo entails personal judgment, the use of additional equipment and machinery, coordination between vessel and terminal personnel, and a greater risk of exposure to the cargo.

Many of the proposals pertinent to the safe handling and transfer of cargo are similar to those contained in Subchapter D of 46 CFR since 1965 and Part 151 of 46 CFR in 1970. For example, since the safe handling of hazardous cargoes requires knowledge of their peculiar properties, a cargo information card describing each cargo, its associated hazards, and routine and emergency procedures would be required to be aboard the vessel and at the terminal. Additional sources of information required would be a copy of this proposed part, a copy of Parts 34 and 35 of Title 46, a cargo location plan, warning signs, and, in some cases, a certification of cargo inhibition or stabilization.

With the exception of certain circumstances in which he could be a tankerman, the person in charge of cargo transfer on U.S. flag vessels would be required to hold a license as master or mate for the vessel that is transferring cargo. The rules under which the Coast Guard would endorse the license of masters and mates of these vessels to transfer cargoes will be published shortly in Subchapter B of Chapter I, Title 46, Code of Federal Regulations. However, at this time the rules have not been finalized; neither has a rule governing the qualifications of the person in charge of cargo transfer for a foreign flag vessel. Therefore, the description of the prerequisites for being the person in charge of cargo transfer proposed in this new part are contingent upon the forthcoming rulemaking for 46 CFR Part 10.

The Coast Guard's goal in making these proposals is that no cargo be untrollably released either as vapor or liquid. However, the degree to which one guards against a release should correspond to the severity of the consequences. Hence, some cargoes require more sophisticated handling than others to present equally low risks. Special operating requirements have been included for alkylene oxides, unusually toxic products, motor fuel antiknock compounds, carbon disulphide, inorganic acids, and others. These requirements are similar to those that apply to the same cargoes aboard unmanned barges in 46 CFR Part 151.

There are also requirements governing cargo sampling procedures, discharge by gas or fluid displacement, emergency termination of transfer, and the movement of vessels alongside the transferring vessel. These requirements necessitate discretionary judgments by the person in charge of transfer; they are currently followed on barges and on foreign flag vessels in U.S. ports as a result of regulation, Captain of the Port requirements, and good practice.

The Coast Guard anticipates that in combination with vessel movement restrictions imposed by local Captains of the Port and the more thorough training and testing that the Coast Guard intends to propose as a prerequisite for transferring the listed cargoes, the proposed rules will significantly reduce the likelihood of life and property losses.

Existing vessels would, of course, need modification in many instances to meet the proposed standards. To allow the owners of vessels that have been carrying these cargoes a flexible schedule whereby they can bring their vessels into compliance, the Coast Guard has included a phase-in period covering five years. The Coast Guard has attempted to follow IMCO's recommendations in grouping requirements for phase-in according to the time a vessel needs to meet them and their importance in controlling the cargo's hazards. The operating requirements would become effective immediately, a group of pumproom ventilation requirements and some tank location restrictions on type I and II ships before 2 years, and virtually all of the remaining requirements within 5 years after the effective date of the rule. Following the IMCO guidelines, the Coast Guard would examine each existing ship that could not meet the damage stability or deckhouse location requirements. The Coast Guard might then endorse the ship for the cargoes in table I that it has carried in the past.

Since the proposals contained in the new part cover some areas that are covered by existing regulations, the Coast Guard has proposed to cancel these existing regulations (46 CFR Part 39 and some portions of Parts 40 and 98). To be consistent with the IMCO Chemical Code, Part 32 would be amended to require a 13.2 foot (4 meter) vent riser with grade A flammables rather than the B/3 riser presently required. Additionally, amendments to other existing parts dealing with the organizational structure of the Coast Guard are included to accommodate the new part and explain its administration and that of certain related regulations.

The Coast Guard has thoroughly reviewed the environmental effects of this proposal as described in "Environmental Impact Statements—Procedures for Consideration", FEDERAL REGISTER, Vol. 40, October 22, 1975, Pg. 48303. We found that the proposal will have no foreseeable significant adverse impact on the human environment.

The Coast Guard has also evaluated the inflationary effects of this proposal. The proposal is not a "major proposal" under the Department of Transportation's "Interim Guidance for the Preparation of Inflation Impact Statements".

Having considered the need for, the contribution to safety made by, and the practicality of these regulations, and to discharge its responsibilities under 46 U.S.C. 170 and 391a, the Coast Guard proposes to amend Chapter I of Title 46 of the Code of Federal Regulations by revoking Part 39; amending Parts 1, 2, 24, 30, 31, 32, 40, 42, 70, 90, 98, 110, and 151 thereof; and adding a new Part 153 as follows:

PART 1—ORGANIZATION, GENERAL COURSE AND METHODS GOVERNING MARINE SAFETY FUNCTIONS

1. In § 1.01(b)(1), by inserting the words "Chief, Cargo and Hazardous Materials Division," immediately after the words "Chief, Merchant Vessel Inspection Division."

2. By adding § 1.01(b)(1)(iv) to read as follows:

§ 1.01 Organization.

* * * * *

(b) * * *

(1) * * *

(iv) The Chief, Cargo and Hazardous Materials Division at Coast Guard Headquarters, under the direction of the Chief, Office of Merchant Marine Safety, administers the program for the development of safe containment systems for certain bulk dangerous cargoes, administers the foreign vessel inspection program for foreign vessels carrying cargoes of potential unusual operating risks, and evaluates the hazards involved in the shipment of dangerous cargoes.

§ 1.20 [Amended]

3. By striking out in the third sentence of § 1.20(b) the word "three" and inserting the word "four" in place thereof.

PART 2—VESSEL INSPECTIONS

§ 2.01–1 [Amended]

4. By adding in § 2.01–1(c) the words "O (Certain Bulk Dangerous Cargoes)," immediately after the words, "J (Electrical Engineering)".

5. By adding § 2.01–7(b)(6) to read as follows:

§ 2.01–7 Classes of vessels (including motorboats) examined or inspected and certificated.

* * * * *

(b) * * *

(6) For vessels carrying certain bulk dangerous cargoes see Subchapter O of this Chapter.

6. By revising footnote number 10 to Table 2.01–7(a) to read as follows: "10 Bulk dangerous cargoes are cargoes specified in table 151.01–10(b) and in table I of Part 153 of this chapter" and in table 2.01–7(a) by revising column 8 to read as follows:

[Cols. 3 through 7 omitted]

Col. 1	Col. 2	Col. 8
Steam	Vessels not over 65 ft in length	All vessels carrying in bulk the cargoes listed in table I of pt. 153.
	Vessels over 65 ft in length	Do.
Motor	Vessels not over 15 gross tons	Do.
	Vessels over 15 gross tons except seagoing motor vessels of 300 gross tons and over.	Do.
Sail	Vessels not over 700 gross tons	Do.
	Vessels over 700 gross tons	Do.
•	• • • • • •	•

§ 2.01–13 [Amended]

7. By revising § 2.01–13(c) to read as follows: "For details concerning application of regulations to foreign vessels, see Part 30 (Tank Vessels), Part 70 (Passenger Vessels, Part 90 (Cargo and Miscellaneous Vessels), § 146.02–2 (Dangerous Cargoes), Part 148 (Bulk Solid Hazardous Materials, Parts 153 and 154 (Certain Bulk Dangerous Cargoes), and Part 175 (Small Passenger Vessels) of this chapter.

8. By adding § 2.01–15(a)(10) to read as follows:

§ 2.01–15 Vessel repairs.

• • • • •

(a) • • •

(10) For vessels carrying compressed gases regulated by Subchapter O (Certain Bulk Dangerous Cargoes), see § 151.50–30(c) of this chapter.

• • • • •

§ 2.01–25 [Amended]

9. By revising the last sentence of § 2.01–25(b)(1) to read as follows: "Further details are set forth in Subchapter D (Tank Vessels), Subchapter H. (Passenger Vessels), Subchapter I (Cargo and Miscellaneous Vessels), Subchapter O (Certain Bulk Dangerous Cargoes), and Subchapter T (Small Passenger Vessels) of this chapter."

10. By revising § 2.20–70(d) to read as follows:

§ 2.20–70 Detailed hazardous materials incident reports.

• • • • •

(d) Form: Copies of Form DOT F-5800.1 and USCG Form CF–4752 are available from any District Commander of the U.S. Coast Guard without charge upon request.

• • • • •

11. By adding § 2.90–1(h) to read as follows:

§ 2.90–1 General requirements.

• • • • •

(h) The requirements for vessels carrying certain bulk dangerous cargoes are in parts 148, 151, and 153 of this chapter.

PART 24—GENERAL PROVISIONS

§ 24.05–1 [Amended]

12. In § 24.05–1(a), by repeating change 6.

PART 30—GENERAL PROVISIONS

§ 30.01–5 [Amended]

13. By revoking § 30.01–5(b) (8) and (9).

14. In § 30.01–5(d), by repeating change 6.

§ 30.10–15 [Amended]

15. § 30.10–15, by striking out the second sentence.

§ 30.10–22 [Amended]

16. In § 30.10–22, by striking out the second sentence.

17. By revising § 30.25–1 to read as follows:

§ 30.25–1 Cargoes carried in vessels certificated under the rules of this subchapter.

The cargoes listed in Table 30.25–1 and mixtures composed solely of these cargoes have been foundt to be flammable or combustible and may be transported in bulk only in vessels certificated under the rules of this subchapter.[1]

TABLE 30.25–1

Acetone
Amyl Actate (iso-, n-)
Amyl Alcohol (n-)
Amyl Tallate
Asphalt
Asphalt Blending Stocks:
  Roofers Flux
  Straight Run Residue
Butane
Butyl Acetate (iso-, n-, sec-)
Butyl Alcohol (iso-, n-, sec-, tert-)
Butyl Benzyl Phthalate
Butylene
1,3-Butylene Glycol
Cumene
Cycloaliphatic Resins
Cyclohexane
Cyclohexanol
Cymene (para-)
Decyl Alcohol (iso-, n-)
Decyl Benzene (-n)
Decyl Benzene (n-)
Decaldehyde (iso-, n-)
Decene
Diacetone Alcohol
Dibutyl Phthalate (ortho-)
Diethylbenzene
Diethylene Glycol
Diethylene Glycol Monobutyl Ether (Methyl Carbitol)
Diethylene Glycol Monobutyl Ether Acetate
Diethylene Glycol Monoethyl Ether
Diethylene Glycol Monomethyl Ether
Diglycidal Ether of Bisphenyl A
Dieheptyl Phthalate
Diisobutylene
Diisobutyl Carbinol
Diisobutyl Ketone
Diisodecyl Phthalate
Dinonyl Phthalate
Dioctyl Phthalate
Diphenyl-diphenyl oxide
Dipropylene Glycol
Distillates:
  Straight Run
  Flashed Feed Stocks
Diundecyl Phthalate
Dodecanol
Dodecylbenzene (commercial)
Epoxylated Linear Alcohols, C11–C15
Ethane
Ethoxylated Alcohols, C12–C15
Ethoxy Trigylcol (crude)
Ethyl Acetate
Ethyl Alcohol
Ethyl Benzene
Ethyl Butanol
Ethylene
Ethylene Glycol
Ethylene Glycol Monobutyl Ether
Ethylene Glycol Monobutyl Ether Acetate
Ethylene Glycol Monoethyl Ether
Ethylene Glycol Monoethyl Ether Acetate
Ethylhexaldehyde
2-Ethyl Hexanol
Ethyl Hexyl Tallate
Farfuryl Alcohol
Gas Oil: Cracked
Gasoline Blending Stocks:
  Alkylates
  Reformates
Gasolines:
  Casinghead (natural)
  Automotive, containing not over 4.23 grams lead per gallon)
  Aviation (containing not over 4.86 grams lead per gallon)
  Polymer
  Straight Run
Gylcerine
Glycol Diacetate
Glyoxal (40%)
Heptane
Heptanol
Hexane (iso-, n-)
Hexanol
Hexene
Hexylene Glycol
Isophorone
Jet Fuels:
  JP–1 (Kerosene)
  JP–3
  JP–4
JP–5 (Kerosene, Heavy)
Kerosene
Latex, Liquid Synthetic
Methane
Methyl Acetate
Methyl Alcohol
Methyl Amyl Acetate
Methyl Amyl Alcohol
Methyl Ethyl Ketone
Methyl Formal (Dimethyl Formal)
Methyl Isobutyl Ketone
Methyl Isobutyl Carbinol
Mineral Spirits
Naptha:
  Solvent
  Stoddard Solvent
  Varnish Makers' and Painters' (75%)
Nonane
Nonene
Nonyl Alcohol
Nonyl Phenol
Nonyl Phenol (ethoxylated)
Octene
Octyl Alcohol (iso-, n-)
Octyl Aldehyde (iso-)
Octyl Epoxytallate

[1] See Part 153 of this chapter for additional rules governing the bulk carriage of dangerous cargoes.

GENERAL VESSEL REQUIREMENTS

Sec.
153.200 Hosetightness of deckhouse portlights, wheelhouse windows, and wheelhouse doors.
153.202 Location of deckhouse doors and airports.
153.208 Ballast equipment.
153.209 Bilge pumping systems.
153.214 Personnel emergency and safety equipment.

CARGO CONTAINMENT SYSTEMS

153.230 Type I system.
153.231 Type II system.
153.232 Type III system.
153.234 Fore and aft location.
153.235 Exceptions to cargo piping location restrictions.
153.236 Prohibited materials.
153.238 Required materials.
153.239 Cast iron prohibited.
153.240 Insulation.
153.250 Double-bottom and deep tanks as cargo tanks.
153.251 Independent cargo tanks.
153.252 Use of spill valves.
153.254 Tank access.
153.256 Trunks, domes, and openings of cargo tanks.
153.258 Tank separation.
153.263 Pressure vacuum gauge.
153.266 Tank linings.
153.267 Special requirement for an independent cargo tank.

CARGO HANDLING EQUIPMENT

153.280 Cargo transfer valving.
153.281 Alternate cargo line valving for tanks adjacent to pumprooms.
153.282 Piping system design.
153.284 Piping point of entry to ship's spaces.
153.286 Cargo piping joints.
153.288 Filling lines.
153.290 Quick closing valve operation.
153.292 Quick closing valve operating time.
153.294 Marking of piping systems.
153.296 Emergency shutdown stations.

CARGO HANDLING SPACE VENTILATION

153.310 Ventilation system type.
153.312 Ventilation system standards.
153.314 Ventilation of spaces not usually occupied.
153.316 Special pumproom ventilation rate.

CARGO PUMPROOMS

153.330 Access.
153.332 Hoisting arrangement.
153.333 Cargo pump discharge pressure gauge.
153.334 Bilge pumping systems.
153.336 Special pumproom location requirements.

CARGO VENTING SYSTEMS

153.350 B/3 and 4 m vent heights.
153.352 B/3 and 4 m vent system outlets.
153.353 High velocity vents.
153.354 Venting system inlet.
153.355 PV venting systems.
153.358 Venting system flow capacity.
153.360 Venting system restriction.
153.362 Venting system drain.
153.364 Venting system supports.
153.366 Spill valves.
153.368 Pressure vacuum valves.
153.370 Minimum RVS for ambient temperature carriage.
153.371 Minimum RVS for refrigerated carriage.
153.372 Vapor return connection for vapor pressures exceeding one atmosphere.

CARGO GAUGING SYSTEMS

153.400 Gauges.
153.404 Containment systems requiring closed gauges.
153.406 Containment systems requiring restricted gauges.
153.407 Restricted gauging system covers.
153.408 Tank overfill controls.

CARGO TEMPERATURE CONTROL SYSTEMS

153.430 Heat transfer systems; general.
153.432 Cooling systems.
153.434 Heat transfer coils within a tank.
153.436 Heat exchange fluid.
153.438 Cargo temperature alarms required.
153.440 Cargo temperature sensors required.

SPECIAL REQUIREMENTS FOR FLAMMABLE OR COMBUSTIBLE CARGOES

153.460 Fire protection systems.
153.461 Electrical bonding of independent tanks.
153.462 Inert gas systems.
153.463 Vent system discharges.
153.464 Fusible elements.
153.465 Flammable vapor detector.

SPECIAL REQUIREMENTS

153.500 Inert gas systems.
153.501 Requirements for dry inert gas.
153.515 Special requirements for extremely flammable cargoes.
153.520 Special requirements for carbon disulphide.
153.525 Special requirements for unusually toxic cargoes.
153.526 Toxic vapor detectors.
153.527 Toxic vapor protection.
153.530 Special requirements for alkylene oxides.
153.545 Special requirements for liquid sulfur.
153.554 Special requirements for acids.
153.555 Special requirements for inorganic acids.
153.556 Special requirements for sulfuric acid and oleum.
153.557 Special requirements for hydrochloric acid.
153.558 Special requirements for phosphoric acid.
153.559 Special requirements for nitric acid (less than 70 percent).
153.600 Special requirements for nitropropane.

TESTING

153.806 Stability test and information.

Subpart C—Operations

GENERAL

153.900 Certificates, letters, endorsements required.
153.901 Document on bridge.
153.902 Cargo antidotes.
153.904 Copy of this subchapter on board.
153.905 Limitations in the endorsement.
153.906 Cargo quantity limitations.
153.907 Cargo information cards.
153.908 Cargo location plan.
153.912 Certificate of inhibition or stabilization.
153.918 Shipping document.
153.920 Copy of shipping document furnished the transfer terminal.
153.922 Obstruction of pumproom ladderways.
153.924 Opening of tanks and cargo sampling.
153.926 Entry into spaces containing cargo vapor.
153.928 Emergencies.

CARGO TRANSFER PROCEDURES

153.950 Person in charge of cargo transfer.
153.951 Signals during cargo transfer.
153.952 Warning signs.
153.953 Incompatible cargo.
153.954 Cargo transfer piping.
153.955 Cargo hose.
153.956 Standards for marking of cargo hose.
153.957 Discharge by gas pressurization.
153.958 Discharge by liquid displacement.
153.960 Approval to begin transfer required.
153.961 Protective clothing required.
153.962 Preparation for cargo transfer.
153.964 Supervision of cargo transfer.
153.966 Gauging with a sounding tube.
153.968 Termination procedures.
153.970 Tank filling limitations.
153.977 Explosives.
153.978 Transfer of packaged cargo of ship's stores.
153.979 Illness, alcohol, drugs.

SPECIAL CARGO PROCEDURES

153.1000 Special operating requirements for cargoes reactive with water.
153.1010 Alkylene oxides.
153.1011 Use of alkylene oxide containment systems and hoses with other products.
153.1020 Unusually toxic cargoes.
153.1025 Motor fuel antiknock compounds.
153.1035 Stabilization of acetone cyanohydrin.
153.1040 Carbon disulphide.
153.1045 Inorganic acids.
153.1046 Sulfuric acid.
153.1052 Carriage of other cargoes in acid tanks.
153.1055 Nitropropane.
153.1060 Inerted cargoes.

MAINTENANCE

153.1500 Venting system rupture disks.
153.1502 Fixed ballast relocation.
153.1504 Inspection of personnel emergency and safety equipment.

Appendix—Table II.

AUTHORITY: The safety regulations of this part are issued under 46 U.S.C. 170 for all dangerous cargoes except flammable and combustible liquids, for which the regulations are issued under 46 U.S.C. 391a.

Subpart A—General

§ 153.1 Applicability.

This part prescribes rules that apply to self propelled vessels that have on board the cargoes described in § 153.5 for the purpose of implementing the requirements in the law governing vessels having on board flammable or combustible liquid cargo in bulk (46 U.S.C. 391a) and the law governing the carriage of explosives and other dangerous articles in bulk (46 U.S.C. 170).

§ 153.2 Definitions.

As used in this part:

(a) "B" means the breadth of the vessel in meters and is defined in § 42.13-15 (d) of this chapter.

(b) "Cargo containment system" means a cargo tank, its cargo piping system, its venting system, and its gauging system.

(c) "Cargo handling space" means an enclosed space that must be entered during a routine loading, carriage, or discharge of cargo and that contains a movable element of the cargo containment system having a seal or packing to prevent the escape of cargo, such as a

Cargo identification	Cargo containment system [1]	Vent height [2]	Vent [3]	Gage [4]	Fire protection system [5]	Special requirements	Electrical hazard group and class [6]
1,4-dioxane	II	B/3	PV	Closed	A	.408, .525, .526, .1020	I-C
Epichlorohydrin	II	B/3	PV	do	A	.316, .336, .408, .525, .526, .1020.	I-C
Ethanolamine	III	NR	Open	Open	A	.236 (b), (c), .526	
Ethyl acrylate	II	4 m	PV	Restricted	A	.526, .912(a)	I-D
Ethylene chlorohydrin	II	B/3	PV	Closed	A, C	.316, .336, .408, .525, .526, .961, .1020.	
Ethylene cyanohydrin	III	NR	Open	Open	A	None	I-D
Ethylenediamine	II	4 m	PV	Restricted	A	.236 (b), (c), .526	I-D
Ethylene dibromide	II	B/3	PV	Closed		.408, .525, .526, .1020	
Ethylene dichloride	II	4 m	PV	Restricted	B	.236(b), .408(a)(1), .526	I-D
Ethyl ether	II	4 m	PV	Closed	A	.236(g), .267, .408, .500, .515, .526, .1060.	I-C
2-ethylhexyl acrylate	III	NR	Open	Open	A	.912(a)	
Ethyl methacrylate	III	4 m	PV	Restricted	B	.912(a), .526	
2-ethyl-3-propyl acrolein.	III	4 m	PV	do	A	.526	
Formaldehyde solution (37 to 50 pct).	III	4 m	PV	do	A	.526	I-C
Formic acid	III	4 m	PV	do	A	.238(b), .526, .554	
Furfural	III	4 m	PV	do	A	.526	
Hydrochloric acid	III	4 m	PV	do		.267, .526, .554, .555, .557, .961, .1045, .1052.	
2-hydroxyethyl acrylate.	II	B/3	PV	Closed	A	.408, .525, .526, .912(a), .961, .1020.	
Isoprene	III	4 m	PV	Restricted	B	.912(a)	I-D
Mesityl oxide	III	4 m	PV	do	A	.408(a)(1), .526	I-D
Methyl acrylate	II	4 m	PV	do	B	.526, .912(a)	I-D
2-methyl-5-ethyl pyridine.	III	NR	Open	Open	A	.236(b)	
Methyl methacrylate	II	4 m	PV	Restricted	B	.526, .912(a)	I-D
(Alpha-) methyl styrene.	III	4 m	PV	do	B	.526, .912(a)	
Morpholine	III	4 m	PV	do	A	.236 (b), (c)	I-C
Motor fuel antiknock compounds (containing lead alkyls).	II	B/3	PV	Closed	B, C	.267, .336, .408, .525, .526, .961, .1020, .1025.	
Naphthalene (liquid)	III	4 m	PV	Restricted	B, C	None	
Nitric acid (70 pct or less).	II	4 m	PV	do		.408, .526, .554, .555, .961, .1045.	
(Mono-) nitrobenzene	II	B/3	PV	Closed	B, C	.316, 336, .408, .525, .961, .1020.	
1- or 2-nitropropane	III	4 m	PV	Restricted	A	.526, .600, .1055	I-C
(Ortho-, para-) nitrotoluene.	II	B/3	PV	Closed	B	.316, .336, .408, .525, .526, .1020.	
Oleum	II	B/3	PV	do		.316, .336, .408, .526, .554, .555, .556, .961, .1000, .1045, .1052.	
Paraldehyde	III	4 m	PV	Restricted	A	None	
Pentachloroethane	III	B/3	PV	do		.316, .336, .525, .526, .1020.	
Phenol	II	B/3	PV	Closed	A	.408, .525, .526, .961, .1020.	
Phosphoric acid	III	NR	Open	Open		.554, .555, .558, .1045, .1052.	
Phthalic anhydride (liquid).	III	4 m	PV	Restricted	D	None	
(Iso-, n-) propanolamine.	III	NR	Open	Open	A	.236 (b), (c), .526	
Propionic acid	III	4 m	PV	Restricted	A	.238(s), .554	I-D
Propionic anhydride	III	4 m	PV	do	A	.238(s), .556	
(Iso-, n-) propylamine	II	B/3	PV	Closed	C	.236 (b), (c), .408, .500, .525, .526, .1020, .1060.	I-D
Propylene oxide	II	4 m	PV	do	A	.500, .526, .530, .1010, .1011, .1060.	I-B
Pyridine	III	4 m	PV	Restricted	A	.236(b)	
Sodium hydrosulfide solution (45 pct or less).	III	4 m	PV	do		.526, .961	
Sodium hypochlorite solution (15 pct or less).	III	4 m	PV	do		.236 (a), (b)	
Styrene	III	4 m	PV	Open	B	.236(b), .912(a)	I-D
Sulfur (liquid)	III	NR	Open	do		.267, .526, .545	
Sulfuric acid	III	NR	do	do		.554, .555, .556, .961, .1000, .1045, .1046, .1052.	
1,1,2,2-tetrachloroethane.	III	B/3	PV	Restricted		.316, .336(a), .525, .526, .1020.	
Tetraethylenepentamine.	III	NR	Open	Open	A	.236 (b), (c)	
Tetrahydrofuran	III	4 m	PV	Restricted	A, D	.526, .912(b)	I-C
Toluene Diisocyanate	II	B/3	PV	Closed	C, D	.236(b), .316, .408, .500, .525, .526, .1000, .1020, .1060.	
Tricresyl phosphate (containing 1 pct or more of the ortho isomer).	II	4 m	PV	do	B	.408, .525(a), .1020	
Triethanolamine	III	NR	Open	Open	A	.236 (a), (b), (c), (g)	
Triethylamine	II	B/3	PV	Restricted	B	.236 (b), (c), .525, .526, .1020.	I-C
Triethylenetetramine	III	NR	Open	Open	A	.236 (a), (b), (c)	
Urea, ammonium nitrate solution (containing more than 2 pct NH_3).	III	4 m	PV	Restricted	A	.236(b), .526	I-D

Footnotes at end of table.

Cargo identification	Cargo containment system [1]	Vent height [2]	Vent [3]	Gage [4]	Fire protection system [5]	Special requirements	Electrical hazard group and class [6]
(Iso-, n-) valeraldehyde.	III	4 m	PV	do	A	.500, .526, .1060	I-C
Vinyl acetate	III	4 m	PV	Open	A	.912(a)	I-D
Vinylidene chloride	II	4 m	PV	Restricted	B	.236 (a), (b), .500, .526, .912 (a), .1060.	I-D
Vinyl ethyl ether	II	4 m	PV	Closed	A	.236 (b), (f), (g), .408, .500, .515, .526, .912(a), .1060.	
Vinyl toluene	III	4 m	PV	Restricted	B	.236 (a), (c), (g), .912(a)	I-D

[1] For details see secs. 153.230–153.232.
[2] For details see sec. 153.350.
[3] For details see sec. 153.355.
[4] For details see secs. 153.400–153.406.
[5] For details see sec. 153.460.
[6] For details see 46 CFR, 111.80–5.
[7] See sec. 153.520(b).

NOTES ON TABLE I

Cargo Containment System—the containment system type, either I, II, or III, is listed. See §§ 153.230 through 153.232.

Vent Heights—the location and height of the vent riser is described in terms of the vent height, either B/3 or 4 m. See § 153.350.

Vent—the type of venting control valve, either pressure vacuum (PV) or open, is listed. See § 153.355.

Gauge—the type of gauge, either closed, restricted (Restr.), or open, is listed. See §§ 153.400–153.406.

Fire Protection System—the type of fire protection system is shown, where—

A is a foam system for water soluble cargoes (alcohol foam), B is a foam system for water insoluble cargoes (regular foam), C is a water spray system, and D is a dry chemical system.

A dry chemical system may be used instead of an A, B, or C type system.

SPECIAL REQUIREMENT

The special requirements are shown by the digits of the section numbers, without the "153" part number preceding them.

ELECTRICAL HAZARD GROUP AND CLASS

This column is for use with subchapter J (Electrical Engineering) of this chapter.

NOTE.—See the appendix to this part for a list of cargoes to which neither this part nor subchapter D (Tank Vessels) of this chapter apply.

Subpart B—Requirements

GENERAL

§ 153.15 Requirements for U.S. flag vessel permits.

To have its Certificate of Inspection endorsed with the name of a cargo listed in table I, a U.S. flag vessel must meet the cargo's requiremens in this subpart.

§ 153.16 Requirements for foreign flag vessel permits.

To have its Letter of Compliance endorsed with the name of a cargo listed in table I, a foreign flag vessel must—

(a) Have an IMCO Certificate endorsed with the name of the cargo and meet any specific requirements in this subpart that the Commandant (G-MHM) may prescribe; or

(b) Meet the requirements of this subpart and § 30.01–1(e) of this chapter.

HULL TYPE CALCULATIONS

§ 153.20 Type I hull calculations.

Calculations for a type I hull must show that it can survive damage as described in §§ 153.32 and 153.34 at any location.

§ 153.21 Type II hull calculations.

(a) Calculations for a type II hull 150 m (approx. 492 ft) or less in length must show that it can survive damage as described in §§ 153.32 and 153.34 at any location except the transverse bulkheads bounding an aft machinery space.

(b) Calculations for a type II hull greater than 150 m (approx 492 ft) in length must show that it can survive damage as described in §§ 153.32 and 153.34 at any location.

§ 153.22 Type III hull calculations.

(a) Calculations for a type III hull less than 125 m (approx. 410 ft) in length must show that it can survive damage as described in §§ 153.32 and 153.34 at any location except an aft machinery space.

(b) Calculations for a type III hull 125 m (approx. 410 ft) or greater in length must show that it can survive damage as described in §§ 153.32 and 153.34 at any location except the transverse bulkheads bounding an aft machinery space.

§ 153.30 Permeability of spaces.

(a) Calculations in which a machinery space is treated as a floodable compartment must be based on an assumed machinery space permeability of 0.85 unless the use of an assumed permeability of less than 0.85 is justified in detail.

(b) The assumed permeability of a flooded space other than a machinery space must be either—

(1) The more disabling of 0.95 or 0.0; or

(2) Based on specific cargo, fuel, or ballast loadings included in the information required under § 153.806(b).

§ 153.32 Damage.

(a) Calculations must assume both collision and grounding damage, separately; and the damage must consist of the most disabling penetration up to and including penetrations having the following dimensions:

(1) *Collision penetration.*

(i) Longitudinal extent: (1/3)L 2/3 or 14.5 m (approx. 0.495L 2/3 or 47.6 feet), whichever is less.

(ii) Transverse extent (inboard from the ship's side at right angles to the centerline at the level of the loadline assigned under subchapter E): B/5 or 11.5 m (approx. 37.7 feet), whichever is less.

(iii) Vertical extent: from the base line upwards without limits.

(2) *Grounding penetration.*

	At the forward end but excluding any damage aft of a point 0.3 L aft of forward perpendicular	At any longitudinal position
(i) Longitudinal	L/10	L/10 or 5 m (approximately 16.4 ft), whichever is less.
(ii) Transverse	B/6 or 10 m (approximately 32.8 ft), whichever is less.	5 m (approximately 16.4 ft).
(iii) Vertical extent from the baseline.	B/15 or 6 m (approximately 20 ft), whichever is less.	B/15 or 6 m (approximately 20 ft), whichever is less.

(b) If the damage assumption excludes a transverse bulkhead bounding a machinery space, the machinery space must be assumed to be damaged as a case separate from the damage assumption.

§ 153.34 Survival.

A tankship is presumed to survive if it meets the following conditions:

(a) *Heel angle.* (1) In the final condition of flooding the angle of heel must not exceed 15° (17° if no part of the freeboard deck is immersed).

(2) However, the Commandant (G-MMT) considers on a case by case basis vessels 150 m or less in length having heel angles greater than 17° but less than 25°.

(b) *Range of stability.* A tankship must have a positive metacentric height throughout the intermediate stages of flooding and—

(1) A positive righting lever for at least 20° beyond the angle of equilibrium;

(2) No unprotected openings for at least 20° beyond the angle of equilibrium; and

(3) A maximum residual righting lever of at least 10 cm (approx. 4 in.) in the final condition of flooding.

(c) *Final waterline.* The final waterline, taking into account sinkage, heel, and trim, must be below any opening through which progressive flooding may take place. A watertight superstructure beyond the extent of damage adds to the stability of the tankship if it is separated from the damage space by a watertight bulkhead.

§ 153.35 *Loadline requirements.*

A vessel that meets §§ 153.20, 153.21, or 153.22 also meets § 42.20-5 of this chapter.

GENERAL VESSEL ARRANGEMENTS

153.200 Hosetightness of deckhouse portlights, wheelhouse windows, and wheelhouse doors.

Unless they are located on the after bulkhead or on the outboard side of the house and the greater of L/25 or 3 m (approx. 10 ft) aft of its forward bulkhead—

(a) Accommodations deckhouse portlights must be fixed; and

(b) Wheelhouse windows that are not fixed and wheelhouse doors must have the dogs and gaskets necessary to make them hosetight.

§ 153.202 Location of deckhouse doors and airports.

Each deckhouse door or airport leading to an accommodations space must be on the aft or outboard side of the deckhouse and at least L/25 but no less than 3 m (approx. 10 ft) aft of the forward bulkhead of the deckhouse.

§ 153.208 Ballast equipment.

(a) Except for the arrangement described in paragraph (b) of this section, no piping that serves a dedicated ballast tank that is adjacent to a cargo tank may enter an engine room or accommodation space.

(b) Piping used only to fill a dedicated ballast tank adjacent to a cargo tank may enter an engine room or accommodation space if the piping has—

(1) A valve that can be operated from the weatherdeck; and

(2) A non-return valve at the point it enters the ballast tank.

(c) Piping, pumps and vent lines serving a dedicated ballast tank may not be located within a cargo containment system.

§ 153.209 Bilge pumping systems.

Bilge pumping systems for cargo pumprooms, slop tanks, and void spaces separated from cargo tanks by only a single bulkhead must be entirely within the locations allowed containment systems in § 153.234.

§ 153.214 Personnel emergency and safety equipment.

Each tankship must have—

(a) Two stretchers or wire baskets complete with equipment for lifting an injured person from a pumproom or a cargo tank;

(b) In addition to any equipment required by Regulation 25, Chapter II, SOLAS 1960, three each of the following:

(1) A 30 minute self-contained breathing apparatus with five refill tanks or cartridges of 30 minutes capacity each;

(2) A large rubber apron, rubber boots, long sleeved rubber gloves, and goggles;

(3) A steel-cored lifeline with harness; and

(4) An explosion-proof lamp;

(c) One set of the equipment required in paragraph (a) of this section and two sets of that required in paragraph (b) of this section stowed in a locker adjacent to the emergency shutdown station required in § 153.296(b), and the remaining equipment of paragraphs (a) and (b) of this section stowed in a locker adjacent to the second emergency shutdown station of § 153.296, both lockers marked as described in § 153.952 (c), (d), and (e) with the legend "SAFETY EQUIPMENT";

(d) A first aid kit;

(e) An oxygen resuscitator; and

(f) A shower and an eye wash fountain that are—

(1) Located on the weatherdeck; and

(2) Marked "EMERGENCY SHOWER" as described in § 153.952 (c), (d), and (e) so that the legend is visible from all work areas of the cargo deck forward of the accommodations deckhouse.

CARGO CONTAINMENT SYSTEM

§ 153.230 *Type I system.*

A type I containment system must meet the following requirements:

(a) It must be in a type I hull.

(b) Except as described in § 153.235—

(1) It may be no closer to the tankship's shell than 76 cm (approx. 30 in.);

(2) It may not be located in any part of the tankship subject to the damage described in §§ 153.32(a)(1)(ii) and 153.32(a)(2)(iii).

§ 153.231 Type II system.

A type II containment system must meet the following requirements:

(a) It must be in at least a type II hull.

(b) Except as described in § 153.235—

(1) It may be no closer to the tankship's shell than 76 cm (approx. 30 in.);

(2) It may not be located in any part of the tankship subject to the damage described in § 153.32(a)(2)(iii).

§ 153.232 Type III system.

A type III containment system must be in at least a type III hull.

§ 153.234 Fore and aft location.

(a) Each cargo containment system and any compartments within which a containment system is located must be forward of a tankship's accommodation spaces.

(b) Except as described in § 153.235, each cargo containment system must be located at least 0.05L aft of the forward perpendicular, but in no case forward of a collision bulkhead.

§ 153.235 Exceptions to cargo piping location restrictions.

Cargo piping may be located in those areas from which a containment system is excluded by §§ 153.230(c), 153.231(c), and 153.234(b) if the cargo piping—

(a) Drains back to the cargo tank;

(b) Enters the tank above the level at which a venting system is required to terminate by § 153.354; and

(c) Rises above the tank a height at least 10% in excess of that which would be reached by a column of the least dense cargo for which the tank is certificated when supported by a pressure equal to the vent system's relief valve setting.

§ 153.236 Prohibited materials.

When a paragraph of this section is referenced in Table I, the materials listed in that paragraph may not be used in components that contact the cargo liquid or vapor.

(a) Aluminum or aluminum alloys;

(b) Copper or copper alloys;

(c) Zinc or galvanized steel;

(d) Magnesium;

(e) Lead;

(f) Silver or silver alloys;

(g) Mercury.

§ 153.235 Required materials.

When a paragraph of this section is referenced in Table I, only those materials listed in that paragraph may be used in components that contact the cargo liquid or vapor.

(a) Aluminum, stainless steel, or steel covered with a protective lining or coating.

(b) (1) With cargo concentrations of 98% or greater, aluminum or stainless steel.

(2) With cargo concentrations of less than 98%, 304L or 316 stainless steel.

§ 153.239 Cast iron prohibited.

No gray cast iron may be used in a cargo containment system.

§ 153.240 Insulation.

Cargo containment system insulation made necessary by the requirements of this part must meet the requirements in § 38.05-20 of this chapter. However, the vapor barrier required by § 38.05-20(b) is unnecessary if the insulation is—

(a) Protected from the weather, and in excess of 46° C (approx. 115° F); or

(b) In an atmosphere whose dewpoint is less than the temperature of any surface in contact with the insulation.

TANKS

§ 153.250 Double-bottom and deep tanks as cargo tanks.

Except in those cases in which Commandant (G-MHM) specifically approves a double-bottom or deep tank as a cargo tank, an integral cargo tank or the hold within which an independent cargo tank is located must extend to the weatherdeck.

§ 153.251 Independent cargo tanks.

(a) An independent cargo tank must meet § 38.05-10(a)(1), (b), (d), and (e)(1) of this chapter, regardless of whether the tank is endorsed to carry a cargo requiring an independent tank.

(b) A tank endorsed to carry a cargo requiring an independent cargo tank must meet §§ 38.05-2(d) and 38.05-4(g) of this chapter.

§ 153.252 Use of spill valves.

A cargo tank with a spill valve must have a remotely actuated quick closing shutoff valve in its fill line.

§ 153.254 Tank access.

(a) A cargo tank must have at least one covered manhole opening into the vapor space described in § 153.354.

(b) An access through a vertical tank surface must be at least 60 cm by 80 cm (approx. 24 by 31 in.) and no more than 60 cm above a foothold, grating, or surface on both sides of the access way.

(c) An access through a horizontal tank surface must be at least 60 cm by 60 cm (approx. 24 by 24 in.).

(d) An access trunk may be no less than 76 cm (approx. 30 in.) in diameter.

§ 153.256 Trunks, domes, and openings of cargo tanks.

(a) The hatch of a cargo tank must—

(1) Be at the highest point of the tank; and

(2) Open on or above the weatherdeck.

(b) To be endorsed to carry a cargo requiring an independent cargo tank, a tank must have—

(1) A trunk or dome at the uppermost part of the tank, extending above the weatherdeck;

(2) Its hatch at the top of the trunk or dome; and

(3) No openings below the weatherdeck.

§ 153.258 Tank separation.

Each cago tank must be separated from machinery spaces, service spaces, accommodation spaces, and areas designed to store potable, domestic, and feed water or edibles by two bulkheads at least 76 cm (approx. 30 in) apart, such as a cofferdam, cargo pumproom, or tank not carrying a cargo listed in this part.[1]

§ 153.263 Pressure vacuum gauge.

Each tank that carries at ambient temperature a cargo whose vapor pressure exceeds 1.033 kp/cm² absolute at 37.3° C (approx. 14.7 psia at 100° F) must have a tank pressure-vacuum gauge where cargo transfer is controlled.

§ 153.266 Tank linings.

A tank lining must be—

(a) At least as elastic as the tank material; and

(b) Applied or attached to the tank as recommended by the lining manufacturer.

§ 153.267 Special requirement for an independent cargo tank.

When table I refers to this section, the cargo tank must be an independent tank.

CARGO HANDLING EQUIPMENT

§ 153.280 Cargo transfer valving.

A cargo transfer system must have—

(a) A manually operated stop valve at each connection between the cargo piping system and a cargo hose;

(b) A manual stop valve, operable from the weatherdeck, on each cargo filling line where it enters the cargo tank;

(c) Either an intank cargo pump or a manually operated stop valve in the tank discharge line where it passes through the tank wall.

§ 153.281 Alternate cargo line valving for tanks adjacent to pumprooms.

The stop valve required by § 153.280(b) may be placed in the cargo pumproom rather than at the cargo tank if—

(a) The pumproom is adjacent to the cargo tank;

(b) The cargo pump for the tank is in the pumproom;

(c) The tank's fill line connects to the cargo pump; and

(d) The tank's fill line has a second stop value between the stop valve required by § 153.280(b) and the cargo pump.

§ 153.282 Piping system design.

Each cargo piping system must meet the standards of part 56 and §§ 38.10–1(b), 38.10–1(e), and 38.10–10(a) of this chapter.

§ 153.284 Piping point of entry to ship's spaces.

(a) A piping system may enter an independent cargo tank only through that part of the trunk or dome extending above the weatherdeck.

(b) A cargo piping system may enter an integral tank beneath the weatherdeck only if the cargo piping system has a stop valve inside the tank in which it terminates, operable from the weatherdeck.

(c) When cargo lines serving different tanks enter a pumproom and connect to a single pump, each cargo line must have a stop valve between the pumproom bulkhead and the point in the pumproom at which it joins the pump and the other cargo lines.

(d) A cargo piping system may enter no machinery space but a cargo pumproom.

§ 153.286 Cargo piping joints.

Nonwelded cargo piping system joints are considered by the Commandant (G-MMT) on a case by case basis.

§ 153.288 Filling lines.

The discharge point of a cargo tank filling line must be no higher above the bottom of the cargo tank or sump than the greater of 10 cm (approx. 4 in.) or the radius of the filling line.

§ 153.290 Quick closing valve operation.

Remotely actuated quick closing shutoff valves required by this part must—

(a) Be of the fail-closed type, that is, they must close on loss of power; and

(b) Allow manual operation.

§ 153.292 Quick closing valve operating time.

Remotely actuated quick closing shutoff valves required by this part must operate from fully open to fully closed in no more than thirty seconds.

§ 153.294 Marking of piping systems.

(a) The tank a cargo piping system serves must be marked on each cargo piping system in characters at least 5 cm (approx. 2 in.) high.

(b) Every hose connection of a cargo piping system must be permanently marked with the cargo piping system's working pressure required by § 38.10–10(a) of this chapter.[2]

§ 153.296 Emergency shutdown stations.

(a) Each tankship must have at least two emergency shutdown stations.

(b) One emergency shutdown station must be located at the after edge of that part of the weatherdeck covering the cargo tanks.

(c) One emergency shutdown station must be accessible when a break in a cargo piping system or hose causes spraying or leaking.

(d) Each emergency shutdown station must contain a single remote actuator for all quick closing shutoff valves required by this part.

(e) Each emergency shutdown station must have the controls necessary to stop all cargo pumps on the tankship.

(f) Each emergency shutdown station must be marked as described in § 153.952 (c), (d), and (e) with the legend "EMERGENCY SHUTDOWN STATION" so that the legend is visible from work areas in that part of the deck above the cargo tanks.

CARGO HANDLING SPACE VENTILATION

§ 153.310 Ventilation system type.

A cargo handling space must have a permanent forced ventilation system of the exhaust type.

§ 153.312 Ventilation system standards.

(a) A ventilation system exhaust duct must discharge no less than 10 m (approx. 32.8 ft) from ventilation intakes, accommodation spaces, and working spaces.

(b) A ventilation system may not recycle vapors from ventilation discharges.

(c) Except for the space served by the ventilation duct, a ventilation duct may not pass through a machinery room, an accommodation space, or working spaces.

(d) A ventilation system must be operable from outside the space it ventilates.

(e) A ventilation system must be sized to change the air in the cargo handling space at least 30 times per hour.

(f) A ventilation system must not allow air to stagnate in any part of a ventilated space.

(g) A ventilation system must be able to exhaust air from both above and below the deck plates of a ventilated space.

§ 153.314 Ventilation of spaces not usually occupied.

(a) Each tankship must have portable ventilation equipment that fits the mount required in paragraph (b)(1) of this section.

(b) Each cofferdam, duct keel, pipe tunnel, and cargo tank hold must have—

(1) A mount for the portable mechanical ventilation equipment required by this section; and

[1] See § 153.234. See also § 32.60–10 of this chapter for limitations on the stowage of combustible liquids adjacent to ignition sources.

[2] See § 153.282 of this part.

(2) Either permanent ventilation ductwork connected to the mount and arranged to supply air to the extremities of the space, or

(3) An attachment for temporary ductwork at the mount with enough ductway in the ventilated space and temporary ductwork stowed aboard the vessel to supply air to the extremities of the space.

§ 153.316 Special pumproom ventilation rate.

When Table I refers to this section, the pumproom ventilation system must change the air in the pumproom 45 times per hour and discharge no less than 4 m (approx. 13.1 ft) above the deck.

CARGO PUMPROOMS

§ 153.330 Access.

(a) The access door to a pumproom must open on the weatherdeck.

(b) A pumproom ladder must meet American National Standards Institute standard A 14.3 (1956).

(c) The access way to a pumproom and its valving must allow passage of a man wearing the breathing apparatus required by § 153.214(b)(1).

(d) No ladderway in a pumproom may be obstructed by piping, framework, or other equipment.

(e) Pumproom ladders and pumproom platforms must have guard railings.

(f) No ladder to a pumproom may have an incline from the horizontal exceeding 60°.

§ 153.332 Hoisting arrangement.

(a) A pumproom located below the weatherdeck must have a permanent hoisting arrangement with a lifting capacity of 250 kg (approx. 550 lbs), operable from the weatherdeck, for the removal of an unconscious person.

(b) The pumproom must have a 60 cm by 60 cm (approx. 2 ft by 2 ft) cross-sectional clearance through the hoistway.

§ 153.333 Cargo pump discharge pressure gauge.

Each cargo pump within a pumproom must have a discharge pressure gauge outside the pumproom.

§ 153.334 Bilge pumping systems.

(a) A cargo pumproom must have a bilge pumping system.

(b) The bilge pumping system must have—

(1) Complete remote operating controls outside the pumproom, and

(2) An alarm that operates when the depth of bilges exceeds 50 cm (approx. 20 in.).

§ 153.336 Special pumproom location requirements.

When Table I refers to this section—

(a) The cargo pump must be an intank cargo pump,

(b) The cargo pumproom must be on or above the weatherdeck, or

(c) The cargo pumproom must have the specific approval of the Commandant (G-MHM).

CARGO VENTING SYSTEMS

§ 153.350 B/3 and 4 m vent heights.

(a) A B/3 venting system must discharge—

(1) At the greatest of the following heights:

(i) 6 m (approx. 20 ft) above the weatherdeck

(ii) B/3 above the weatherdeck

(iii) 6 m (approx. 20 ft) above any walkway that extends to within 6m (approx. 20 ft) of a line through the vent discharge and perpendicular to the deck; and

(2) At least 15 m (approx. 49 ft) from air intakes for, or openings into, accommodation and service spaces.

(b) A 4m venting system must discharge at least—

(1) 4 m (approx. 13.1 ft) above the higher of—

(i) The weatherdeck; or

(ii) Any walkway that extends to within 4 m (approx. 13 ft) of a line through the vent discharge and perpendicular to the deck; and

(2) 10 m (approx. 32.8 ft) from—

(i) An air intake for an accommodation or service space; and

(ii) An opening to an accommodation or service space.

§ 153.352 B/3 and 4 m venting system outlets.

A B/3 or 4 m venting system outlet must—

(a) Discharge vertically upwards; and

(b) Prevent precipitation from entering the vent system.

§ 153.353 High velocity vents.

The Commandant (G-MHM) considers on a case by case basis reductions in the 4 m or B/3 vent height requirements with the use of high velocity variable orifice vent outlets.

§ 153.354 Venting system inlet.

A venting system must terminate in the vapor space above the cargo when the tank is filled to a 2% ullage and the tankship has no heel or trim.

§ 153.355 PV venting systems.

When Table I requires a PV venting system, the cargo tank must have a PV valve in its vent line. The PV valve must be located between the tank and any connection to another tank's vent line (such as at a vent riser common to two tanks).

§ 153.358 Venting system flow capacity.

(a) The cross-sectional flow area of any vent system segment, including any PV or SR valve, may at no point be less than that of a pipe whose inside diameter is 6.4 cm (approx. 2½ in.).

(b) When Table I requires a closed or restricted gauging system, calculations must show that, under conditions in which a saturated cargo vapor is discharged through the venting system at the maximum anticipated loading rate, the pressure differential between the cargo tank vapor space and the atmosphere does not exceed 0.281 kp/cm² gauge (approx. 4 psig), or, for independent tanks, the maximum working pressure of the tank.

§ 153.360 Venting system restriction.

A venting system may have no assembly that could reduce its cross-sectional flow area or flow capacity to less than that required in § 153.358.

§ 153.362 Vent system drain.

Each vent system must have a drain valve at the lowest point in the system.

§ 153.364 Vent system supports.

Supports for a vent system must meet § 38.10(c) of this chapter.

§ 153.366 Spill valves.

A spill valve—

(a) Must discharge into a container of at least 0.6 m³ (approx. 4 barrels) capacity at any heel or trim allowed in the stability manual required by § 153.806;

(b) May not discharge into the waterway; and

(c) Must meet Subpart 162.017 of this chapter.

§ 153.368 Pressure vacuum valves.

(a) The pressure side of a required pressure vacuum relief valve must relieve only at a pressure exceeding 0.035 kp/cm² gauge (approx. 0.5 psig).

(b) A pressure vacuum relief valve must meet the requirements of subpart 162.017 of this chapter.

§ 153.370 Minimum RVS for ambient temperature carriage.

The RVS for a containment system that carries a cargo at ambient temperature must at least equal the cargo's vapor pressure at 46° C (approx. 115° F).

§ 153.371 Minimum RVS for refrigerated carriage.

A refrigerated cargo tank must have its RVS at least equal to the lesser of—

(a) That in § 153.370; or

(b) 110 percent of the cargo's vapor pressure at the steady state temperature obtained by a full tank of cargo with the refrigeration system operating under ambient conditions described within the definition of a refrigerated tank in § 153.2(x).

§ 153.372 Vapor return connection for vapor pressures exceeding one atmosphere.

A vent system for a containment system that carries at ambient temperature a cargo whose vapor pressure exceeds 1.033 kp/cm² absolute at 37.8° C (approx. 14.7 psia at 100° F) must have a vapor return connection.

CARGO GAUGING SYSTEMS

§ 153.400 Gauges.

(a) A sounding tube—

(1) May not be installed on a tank whose RVS exceeds 0.281 kp/cm² gauge (approx. 5 psig); and

(2) Must have a cover that seals the opening when in place.

(b) Columnar gauge glasses may not be used.

(c) Flat sight glasses must meet § 38.-10-20(h) of this chapter.

§ 153.404 Containment systems requiring closed gauges.

When table I requires a cargo's containment system to have a closed gauge, the containment system must have—

(a) A vapor return connection;

(b) Either a closed cargo sampling system or cargo sampling arrangement allowing the retrieval of a sample through an orifice not exceeding—

(1) 0.635 cm (approx. 0.25 in.) diameter when the cargo's vapor pressure is 0.281 kp/cm² gauge (approx. 4 psig) or less; or

(2) 0.140 cm (approx. 0.055 in.) diameter when the cargo's vapor pressure exceeds 0.281 kp/cm² gauge (approx. 4 psig);

(c) Separate audible and visual high level alarms that—

(1) Signal when the tank is filled beyond 97% of its capacity; and

(2) Can be seen adn heard where cargo transfer is controlled and on the open deck; and

(d) A permanently installed closed gauging system.

§ 153.406 Containment systems requiring restricted gauges.

When table I requires a cargo's containment system to have a restricted gauge, the containment system must have—

(a) A restricted gauging system with—

(1) An orifice diameter not exceeding 5 cm (approx. 2 in.) when the cargo tank's RVS is 0.281 kp/cm² gauge (approx. 4 psig) or less, and

(2) An orifice diameter not exceeding 0.140 cm (approx. 0.055 n.) when the cargo tank's RVS exceeds 0.281 kp/cm² gauge (approx. 4 psig); and

(b) A venting system having one of the following:

(1) Only lock open PV valves,

(2) A valved bypass around a PV valve, or

(3) An RVS exceeding 0.281 kp/cm² gauge (approx. 4 psig).

§ 153.407 Restricted gauging system covers.

A restricted gauging system must have a permanently attached cover that is vapor tight when in place.

§ 153.408 Tank overfill controls.

(a) When Table I refers to this section, a cargo containment system must have—

(1) A cargo high level alarm system that meets § 153.404(c) and whose operation can be checked before each loading;

(2) A tank overfill control system that automatically closes the filling line when the tank is filled beyond 98% of its capacity; and

(3) A continuous tank cargo level indicator.

(b) The high level alarm system must be completely independent of the overfill control system.

(c) Each high level alarm must be marked as described in § 153.952(c), (d) and (e) with the legend "TANK OVERFILL ALARM" so that the legend is visible from work areas of the cargo deck forward of the accommodations deckhouse.

CARGO TEMPERATURE CONTROL SYSTEMS

§ 153.430 Heat transfer systems; general.

Each cargo cooling system required by this part and each cargo heating system must—

(a) Meet the standards of Subchapters F (Marine Engineering and J (Electrical Engineering) of this chapter;

(b) Have valving that enables the system to be isolated from any other heat transfer system; and

(c) Allow manual regulation of the system's heat transfer rate.

§ 153.432 Cooling systems.

(a) Each cooling system required by this part must control temperature automatically.

(b) Each component of a required automatic cooling system that has powered parts, such as a motor, compressor, pump, valve operator, or fan, must have an equivalent standby part that can be placed in operation immediately after an equipment failure.

§ 153.434 Heat transfer coils within a tank.

A cargo cooling or heating system having coils within a tank must keep the heat transfer fluid at a pressure greater than that of the cargo.

§ 153.436 Heat transfer fluid.

A heat transfer fluid must have the approval of the Commandant (G-MHM) for use with each particular cargo.

§ 153.438 Cargo temperature alarms required.

(a) Each refrigerated tank must have either an alarm that operates when the cargo's pressure exceeds the vapor pressure described in § 153.371(b) or an alarm that operates when the cargo's temperature exceeds the steady state temperature described in § 153.371(b).

(b) The alarm must give an audible and visual signal on the bridge and at the cargo control station.

(c) The cargo pressure or temperature alarm must be independent of other cargo pressure or temperature sensing arrangements.

§ 153.440 Cargo temperature sensors required.

(a) Each elevated temperature or refrigerated cargo tank must have at least two remote reading temperature sensors within the cargo space at the bottom of the tank.

(b) A refrigerated cargo tank must have a third sensor in the vapor space of the tank.

(c) A readout for each temperature sensor required by this section must be at the point where cargo transfer is controlled.

SPECIAL REQUIREMENTS FOR FLAMMABLE OR COMBUSTIBLE CARGOES

§ 153.460 Fire protection systems.

(a) With the exception of the vent riser, each part of a cargo containment system exposed on the weatherdeck must be covered by either a dry chemical fire protection system or an alternate system listed beside the cargo in Table I and described in the footnotes to Table I.

(b) A fire protection system required by this part must meet Part 34 of this chapter.

§ 153.461 Electrical bonding of independent tanks.

An independent metallic cargo tank that carries a flammable or combustible cargo must be electrically bonded to the tankship's hull.

§ 153.462 Inert gas systems.

An inert gas system on a tank that carries a flammable or combustible cargo must not create static arcing as the inert gas is injected into the tank.

§ 153.463 Vent system discharges.

The discharge from a vent system on a tank carrying a flammable or combustible cargo must be at least 10 m (approx. 32.8 ft) from any ignition source.

§ 153.464 Fusible elements.

Each remotely actuated quick closing shutoff valve on a containment system that carries a flammable or combustible cargo must have a fusible element that melts at less than 104° C (approx. 220° F) and closes the valve.

§ 153.465 Flammable vapor detector.

A tankship that carries a flammable cargo must have two portable vapor detectors that meet § 35.30-15(b) of this chapter.

SPECIAL REQUIREMENTS

When Table I refers to this section, a cargo containment system must have a permanent inert gas system that—

§ 153.500 Inert gas systems.

(a) Maintains the vapor space of the containment system in an inert state by filling the vapor space with a gas that is neither reactive with the cargo nor flammable;

(b) Maintains at least a 0.141 kp/cm² gauge (approx. 2 psig) pressure of gas within the containment system continuously;

(c) Has storage for enough inerting gas to replace that normally lost, while the tank's atmosphere is maintained in an inert condition (e.g. through tank breathing and relief valve leakage) but in no case an amount less than 5 percent of the tank's capacity; and

(d) Has the capacity to supply gas at 1.5 times the volumetric cargo discharge rate.

§ 153.501 Requirement for dry inert gas.

When Table I refers to this section, an inert gas system for the containment system must supply inert gas containing no more than 100 ppm water.

§ 153.515 Special requirements for extremely flammable cargoes.

When table I refers to this section—

(a) An enclosed space containing a cargo tank must have an inerting system that meets the requirements in § 153.500 that apply to the inert gas system of a containment system, and

(b) A cargo containment system must have—

(1) Only a cargo discharge pump that avoids liquid pressure against the shaft gland or that is submerged; and

(2) The cargo tank's RVS at 0.211 kp/cm² gauge (approx. 3 psig) or greater.

§ 153.520 Special requirements for carbon disulphide.

A containment system carrying carbon disulphide must meet the following:

(a) Each cargo pump must be of the intank type and encased within a cylindrical well that extends from the top of the tank to a point no more than 10 cm (approx. 4 in.) above the bottom of the tank.

(b) A tankship must have no

(1) Electrical equipment; or

(2) Equipment that may exceed a temperature of 80° C (approx. 175° F)

where the use of electrical equipment is restricted by § 111.85–10 of this chapter.

(c) The cargo piping and venting systems must be completely independent of those for other cargo.

(d) Pressure relief valves must be made of stainless steel.

§ 153.525 Special requirements for unusually toxic cargoes.

When Table I refers to this section a containment system must meet the following:

(a) The cargo piping system must be completely separate from any containment system carrying a cargo not covered by this section.

(b) A cargo tank's RVS must be no less than .211 kp/cm² guage (approx. 3 psig).

(c) All cargo pumps and valves located below the weatherdeck must be operable from the weatherdeck.

(d) A heat transfer system for the cargo may not enter the engine room and must be either—

(1) Independent of any other system; or

(2) Totally external to the cargo containment system.

(e) A cargo containment system must be separated from bunkers by at least two bulkheads.

(f) A cargo tank's venting system must have a vapor return connection.

§ 153.526 Toxic vapor detectors.

When Table I refers to this section, a tankship must have two toxic vapor detectors, at least one of which must be portable, each able to measure the threshold limit value (TLV) vapor concentration of the cargo. These vapor detectors may be combined with those required by § 153.465.

§ 153.527 Toxic vapor protection.

When Table I refers to this section, a tankship must have on board for each crewmember a respiratory protective device having a service life of 5 minutes at cargo concentrations of ten times the cargo's TLV.

§ 153.530 Special requirements for alkylene oxides.

When Table I refers to this section, a containment system must meet the following:

(a) The tank's RVS must not be less than .211 kp/cm² gauge (approx. 3 psig).

(b) A cooling system—

(1) May not compress the cargo;

(2) Must regulate the cargo temperature automatically and allow manual regulation; and

(3) Must maintain the cargo temperature below 40°C (approx. 104°F).

(c) The cargo piping system must—

(1) Comply with part 38 of this chapter;

(2) Be completely separate from all other systems; and

(3) Be assembled from valves, fittings, and accessories having a pressure rating of 10.5 kp/cm² gauge (approx. 150 psig) (American National Standards Institute) or greater.

(d) Valve disks or disk faces, seats, and other wearing valve parts must be made of stainless steel containing no less than 11 percent chromium.

(e) The venting system must be entirely separate from other containment or tankship systems.

(f) When a cargo tank is in an enclosed space, the space must be fitted—

(1) With an inert gas system meeting the requirements that apply to the inert gas system of a containment system in § 153.500; or

(2) With a forced ventilation system meeting the requirements that apply to a cargo handling space ventilation system in § 153.312.

(g) Cofferdams, cargo tanks, double bottom spaces, and other enclosed spaces adjacent to an integral cargo tank must have an inert gas system meeting the requirements that apply to the inert gas system of a containment system in § 153.500.

(h) All ventilation machinery must be of non-sparking construction as defined in § 110.15–175(1) of this chapter.

(i) The cargo may be discharged only by an intank pump or inert gas displacement.

(j) The cargo piping system's hose connection must have a remotely actuated quick closing shutoff valve.

(k) Cargo hose must—

(1) Have a specific approval of the Commandant (G–MMT) for use in alkylene oxide transfer; and

(2) Be marked "For Alkylene Oxide Transfer Only".

(l) All exposed parts of the cargo containment system above or on the deck, such as tank domes, cargo piping, and loading manifolds, must be covered by a water spray system that—

(1) Operates automatically in a fire involving the cargo containment system;

(2) Has at least two remote manual actuators, one in each emergency shutdown station required by § 153.296; and

(3) Covers the area of application with a uniform spray of 0.175 l/m² sec (0.0043 gal/ft² sec).

§ 153.545 Special requirements for liquid sulfur.

(a) A containment system carrying liquid sulfur must have—

(1) A cargo tank ventilation system that—

(i) Maintains the H_2S vapor concentration below 1.85% by volume; and

(ii) Prevents sulfur buildup within itself; and

(2) An alarm system designed to operate when the ventilation system blower fails.

(b) The void spaces around a cargo tank that carries liquid sulfur must be oil tight.

(c) A cargo tank that carries liquid sulfur and the void spaces surrounding the tank must have connections through which vapor may be sampled.

§ 153.554 Special requirements for acids.

When Table I refers to this section—

(a) Each containment system loading or discharge connection must have a spray shield;

(b) A cargo containment system must be separated from bunkers by double walls, such as a cofferdam and piping tunnels; and

(c) A vessel must have on board a means to determine whether cargo has leaked into a space.

§ 153.555 Special requirements for inorganic acids.

When Table I refers to this section—

(a) A tankship's shell plating may not be in the boundary of any part of the cargo tank; and

(b) An enclosed compartment containing or a compartment adjacent to a cargo tank may have no electrical equipment.

§ 153.556 Special requirements for sulfuric acid and oleum.

(a) A containment system for the carriage of sulfuric acid may be—

(1) Made of unlined steel if the cargo composition is between 70 and 80 or between 90 and 100 percent acid by weight;

(2) Lined with lead if the cargo composition does not exceed 96 percent acid by weight; or

(3) Lined with rubber if the cargo composition does not exceed 51 percent acid by weight.

(b) A containment system for oleum may be of unlined steel if the concentration of free sulfur trioxide in the oleum exceeds 4 percent by weight.

(c) Containment systems for the carriage of contaminated sulfuric acid or of oleum or sulfuric acid at concentrations differing from those specified in this section or of materials different from those specified to this section are considered by

the Commandant (G-MHM) on a case by case basis.

§ 153.557 *Special requirements for hydrochloric acid.*

(a) A containment system that carries hydrochloric acid must be lined with—

(1) Rubber; or

(2) A material approved for hydrochloric acid tanks by the Commandant (G-MHM).

(b) Containment systems for contaminated hydrochloric acid are considered by the Commandant (G-MHM) on a case-by-case basis.

§ 153.558 Special requirements for phosphoric acid.

(a) In this part, "phosphoric acid" means superphosphoric acid, phosphoric acid, and aqueous solutions of phosphoric acid.

(b) A phosphoric acid containment system must be—

(1) Lined with rubber;

(2) Lined with a material approved for phosphoric acid tanks by the Commandant (G-MHM); or

(3) Made of a stainless steel that resists corrosion by phosphoric acid.

§ 153.559 Special requirements for nitric acid (less than 70 percent).

A containment system that carrier nitric acid (less than 70 percent) must be of stainless steel that resists corrosion by nitric acid.

§ 153.600 *Special requirements for nitropropane.*

When a cargo in Table I is referenced to this section, the cargo tank may not be a deck tank.

TESTING

§ 153.806 Stability test and information.

(a) A tankship must meet Part 93 of this chapter.

(b) The tankship must have a manual containing—

(1) Information that enables the master to load and ballast the tankship while keeping structural stresses within design limits;

(2) Damage stability information including, but not limited to, all loading restrictions necessary to ensure the tankship meets the requirements for its hull type; and

(3) Trim information.

Subpart C—Operations

GENERAL

§ 153.900 Certificates, letters, endorsements required.

(a) Each U.S. flag vessel carrying a cargo to which this part applies must have its Certificate of Inspection issued under Subchapter D (Tank Vessels) of this chapter endorsed in accordance with this part with the name of the cargo.

(b) Each foreign flag vessel carrying a cargo to which this part applies must have—

(1) A Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk issued by the country of registry and its Letter of Compliance issued under Part 154 of this chapter endorsed under this part with the name of the cargo; or

(2) Its Letter of Compliance issued under Part 154 of this chapter endorsed under this part with the name of the cargo.

§ 153.901 Document on bridge.

No person may operate a vessel that has on board a cargo to which this part applies unless the endorsed document required by § 153.900 is under glass on the bridge of that vessel.

§ 153.902 Cargo antidotes.

No person may operate a tankship that carries a cargo listed in Table I unless the tankship has on board the antidotes described for the cargo in the "Medical First Aid Guide for Use in Accidents Involving Dangerous Goods," published by IMCO.

§ 153.904 Copy of this subchapter on board.

No person may operate a tankship unless a copy of this part and Parts 34 and 35 of this chapter are on board.

§ 153.905 Limitations in the endorsement.

No person may operate a tankship unless he complies with all limitations in the endorsement on the vessel's Certificate of Inspection, or Letter of Compliance.

§ 153.906 Cargo quantity limitations.

(a) No person may load any cargo tank with more than 1250 m^3 (approx. 44,140 ft^3) of a cargo requiring a type I containment system, or may any person operate a tankship having on board a tank containing in excess of 1250 m^3 of a cargo requiring a type I containment system.

(b) No person may load any cargo tank with more than 3000 m^3 (approx. 106,000 ft^3) of a cargo requiring a type II containment system, nor may any person operate a tankship having on board a tank containing in excess of 3000 m^3 of a cargo requiring a type II containment system.

§ 153.907 Cargo information cards.

(a) No person may operate a tankship unless a cargo information card for each cargo being transported that is listed in Table I is carried either on the bridge, in the ship's office, or in another location easily accessible to the person in charge of the watch.

(b) While a tankship is moored at a terminal, the senior deck officer shall ensure that an additional set of information cards in English is held by the terminal personnel.

(c) Each card must be at least 17 cm x 24 cm (approx. 7" x 9½"), with printing on one side only and must contain the following information about the cargo:

(1) Its name, as listed in table I.

(2) Its appearance.

(3) Its odor.

(4) The hazards involved in handling it, instructions for safe handling, and any special handling procedures, such as inerting.

(5) Procedures to follow in the event of spills, leaks, equipment breakdown, or uncontrolled cargo release.

(6) Procedures to follow if someone is exposed to the cargo.

(7) Effective fire fighting procedures and extinguishing agents.

§ 153.908 Cargo location plan.

(a) The cargo location plan must show the location and number of each cargo tank and the name of the cargo of each tank.

(b) The cargo location plan must be kept with each required set of cargo information cards.

(c) Cargo names on the plan may not differ from those listed tables I, II, or § 30.25-1 of this chapter.

§ 153.912 *Certificate of inhibition or stabilization.*

(a) No person may operate a tankship carrying a cargo referenced to this paragraph in Table I without written certification, carried on the bridge of the tankship, from the shipper that the product is inhibited.

(b) No person may operate a tankship carrying a cargo referenced to this paragraph in Table I without written certification, carried on the bridge of the tankship, from the shipper that the product is stabilized.

(c) The certification required by this section must contain the following information:

(1) Whether the cargo is inhibited or stabilized.

(2) The name and concentration of the inhibitor or stabilizer.

(3) The date the inhibitor or stabilizer was added.

(4) The length of time the inhibitor or stabilizer is effective.

(5) Any temperature limitations qualifying the inhibitor's or stabilizer's effective lifetime.

(6) The action to be taken should the time of voyage exceed the inhibitor's or stabilizer's useful life.

§ 153.918 Shipping document.

No person may operate a tankship without a shipping document, such as a manifest, on the bridge of the tankship completed by the shipper, the tankship's master, the shipowner, or the tankship's agent that lists for each cargo on board—

(a) The tank in which the cargo is stowed;

(b) The name of the shipper;

(c) The location of the loading terminal;

(d) The cargo name listed in Table I or § 30.25-1 of this chapter, or the shipper's name for the cargo if it is not listed; and

(e) The quantity of the cargo.

§ 153.920 Copy of shipping document furnished the transfer terminal.

While a tankship is moored at a transfer terminal, the senior deck officer shall ensure that the terminal is furnished at least one copy of the shipping document.

§ 153.922 Obstruction of pumproom ladderways.

The senior deck officer shall ensure that all cargo pumproom ladderways are unobstructed.

§ 153.924 Opening of tanks and cargo sampling.

(a) Except as provided in paragraph (b) of this section, the senior deck officer shall ensure that all cargo tank hatches, ullage openings, and tank cleaning openings are tightly closed at all times.

(b) The senior deck officer may authorize the opening of a cargo tank—

(1) During tank cleaning;

(2) During cargo transfer if Table I allows the carriage of the cargo in a containment system having an open gauging system;

(3) To sample a cargo that Table I allows to be carried in a containment system having a restricted gauging system if—

(i) The tank is not being filled during sampling;

(ii) The vent system has relieved any pressure in the tank;

(iii) The person sampling the cargo wears the protective clothing required during cargo transfer; and

(iv) The tank is closed tightly following sampling.

(c) The senior deck officer shall ensure that cargoes requiring closed gauging are sampled only through the controlled sampling arrangement required by § 153.404(b).

§ 153.926 Entry into spaces containing cargo vapor.

(a) No person may enter a cargo handling space without the permission of the senior deck officer.

(b) Before permitting anyone to enter a cargo handling space, the senior deck officer shall ensure that—

(1) The compartment is free of toxic vapors and has sufficient oxygen to support life; or

(2) Those entering the space wear protective equipment with breathing apparatus, and an officer closely supervises the entire operation.

§ 153.928 Emergencies.

The person in charge of a tankship may deviate or allow a deviation from any rule in this subpart to the extent he determines necessary in any emergency endangering the ship, its crew, or people nearby.

CARGO TRANSFER PROCEDURES

§ 153.950 Person in charge of cargo transfer.

(a) The senior deck officer shall ensure that cargo transfer operations are supervised by a person designated as a person in charge of cargo transfer under this section.

(b) No person may serve, and no one may use the services of a person, as a person-in-charge of cargo transfer on a U.S. flag tankship unless he—

(1) Is designated by the master; and either

(2) Holds a valid deck license endorsed under 46 CFR 10.05 for the grade of cargo being transferred and authorizing service aboard the vessel transferring cargo; or

(3) Is one of the tankermen required for a small vessel by 46 CFR 31.14–1(b).

(c) No person may serve, and no one may use the services of a person as a person in charge of cargo transfer on a foreign flag tankship unless the person—

(1) Holds a valid document issued by the flag administration authorizing service as a person in charge aboard the vessel that is transferring cargo;

(2) Is designated by the master;

(3) Is readily able to communicate in English either directly or through an interpreter who is available to him during the transfer; and

(4) Has studied and understands his responsibilities as described in this subchapter.

§ 153.951 Signals during cargo transfer.

The senior deck officer shall ensure that—

(a) The tankship displays a red flag in the day and a red light at night when transferring cargo while fast to a dock;

(b) The tankship displays a red flag when transferring cargo while at anchor; and

(c) The red flag or the red light is visible from all sides of the tankship.

§ 153.952 Warning signs.

(a) When transferring cargo while fast to a dock or while at anchor in port, a tankship must display a warning sign at the gangway facing the shore so that it may be seen from the shore and another warning sign facing outboard towards the water so that it may be seen from the water.

(b) Except as provided in paragraph (f) of this section, each warning sign must have the following legends:

(1) Warning.

(2) Dangerous Cargo.

(3) No Visitors.

(4) No Smoking.

(5) No Open Lights.

(c) Each letter must be block style, black on a white background.

(d) Each letter must—

(1) Be 7.5 cm (approx. 3 in.) high;

(2) Be 5 cm (approx. 2 in.) wide except for "M" and "W" which must be 7.5 cm (approx. 3 in.) wide and the letter "I" which may be 1.3 cm (approx. ½ in.) wide; and

(3) Have 1.3 cm (approx. ⅓ in.) stroke width.

(e) The spacing must be—

(1) 1.3 cm (approx. ½ in.) between letters of the same word;

(2) 5 cm (approx. 2 in.) between words;

(3) 5 cm (approx. 2 in.) between lines; and

(4) 5 cm (approx. 2 in.) at the borders of the sign.

(f) The legends "No Smoking" and "No Open Lights" are not required when the cargoes on board the tankship are neither flammable nor combustible.

§ 153.953 Incompatible cargo.

(a) The person in charge of cargo transfer may not authorize the loading of incompatible [4] cargoes into cargo containment systems unless the cargo containment systems are separated by double walls or double bulkheads, such as—

(1) Cofferdams;

(2) Empty tanks;

(3) Tanks containing mutually compatible cargo; and

(4) Piping tunnels.

(b) The person in charge of cargo transfer may not authorize loading of incompatible cargoes into cargo containment systems that have common piping or venting systems.

§ 153.954 Cargo transfer piping.

The person in charge of cargo transfer shall ensure that—

(a) Cargo is transferred to or from a cargo tank only through the tankship's cargo piping system; and

(b) All cargo vapor is returned to shore through the valved connection on the venting system if—

(1) The cargo requires closed gauging, is referenced to § 153.372 or is referenced to § 153.525;

(2) The transfer terminal has vapor return equipment; and

(3) In his estimation the vapor return equipment is adequate to handle the vapor expected from the tank.

§ 153.955 Cargo hose.

The person in charge of cargo transfer may not authorize the connection of a hose to a cargo containment system unless—

(a) The hose is marked as meeting the standards of § 153.956;

(b) The date of the hose's last pressure test is within one year of the date on which the hose is used to transfer cargo;

(c) The recommended working pressure marked on a hose used for discharge meets or exceeds the working pressure marked on the cargo piping at the hose connection; and

(d) The cargo's temperature is within th manufacturer's recommended maximum and minimum hose temperatures.

§ 153.956 Standards for marking of cargo hose.

To be marked as meeting the standards of this section, the hose assembly must meet the following standards:

(a) Each hose assembly must have—

(1) Full threaded connections;

[4] Incompatible cargoes are listed in NVO 4–75, available from the Commandant (G-MHM-3/83), U.S. Coast Guard, Washington, D.C. 20590. Telephone number: (202) 426-1577.

(2) Flanges that meet standard B16.5, Steel Pipe Flanges and Flanges Fittings, or standard B16.31, Nonferrous Pipe Flanges, of the American National Standards Institute; or

(3) Quick-connect couplings that are acceptable to the Commandant (G-MMT).

(b) Each hose assembly must be marked with the—

(1) Date of manufacture;

(2) Minimum bursting pressure;

(3) Recommended working pressure;

(4) Date of the last test required by paragraph (f) of this section;

(5) Pressure used for that test; and

(6) Manufacturer's recommended maximum and minimum temperatures.

(c) A cargo hose assembly must have a minimum bursting pressure of at least 52.5 kp/cm² gauge (approx. 750 psig) and a recommended working pressure of at least 10.5 kp/cm² gauge (approx. 150 psig).

(d) The minimum bursting pressure marked on the hose may not exceed—

(1) That stated by the manufacturer of the hose assembly;

(2) Five times the manufacturer's recommended working pressure; and

(3) Five times the test pressure used in the last test under paragraph (f) of this section.

(e) The recommended working pressure may not exceed twenty per cent (one fifth) the minimum bursting pressure.

(f) A cargo hose assembly must be inspected and tested by placing it in a straight, horizontal position so that its entire external surface is accessible and ascertaining that the hose assembly—

(1) Has no loose covers, kinks, bulges, soft spots, and no gouges, cuts, or slashes that penetrate any hose reinforcement;

(2) Has no external and, to the extent internal inspection is possible with both ends of the hose open, no internal deterioration; and

(3) Does not burst, bulge, leak, or abnormally distort under static liquid pressure at least as great as the recommended working pressure.

§ 153.957 Discharge by gas pressurization.

The person in charge of cargo transfer may not authorize cargo discharge by gas pressurization unless—

(a) The tank to be offloaded has an SR or PV venting system;

(b) The pressurizing medium is either the cargo vapor or a nonflammable, nontoxic gas inert to the cargo; and

(c) The pressurizing line has—

(1) A pressure reducing valve whose setting does not exceed 90% of the tank's RVS and a manual control valve between the pressure reducing valve and the tank; or

(2) For an inert gas medium—

(i) A safety relief valve with a cross sectional flow area at least equal to that of the line, whose relieving pressure does not exceed 90% of the tank's RVS;

(ii) A manual control valve between the safety relief valve and the tank; and

(iii) A check valve between the manual control valve and the tank.

§ 153.958 Discharge by liquid displacement.

The person in charge of cargo transfer may not authorize cargo discharge by liquid displacement unless the liquid supply line to the tank has—

(a) A safety relief or pressure reducing valve set to operate at no more than 80 percent of the tank's RVS; and

(b) A manual control valve between the tank and the supply line's safety relief valve or pressure reducing valve.

§ 153.960 Approval to begin transfer required.

No person may transfer cargo or make connections for cargo transfer unless he has authorization from the person in charge of cargo transfer.

§ 153.961 Protective clothing required.

When Table I refers to this section, the senior deck officer shall ensure that every person forward of the accommodation deckhouse who is involved with cargo sampling, gauging, or making or breaking cargo connections wears a large apron, boots, gloves, and tight-fitting goggles.

§ 153.962 Preparation for cargo transfer.

The person in charge of cargo transfer may not approve and must discontinue cargo transfer unless—

(a) No fires or open flames are on deck or in compartments near the hose connections, when Table I requires the cargo's containment system to have fire protection;

(b) Any electrical bonding of the tankship to the transfer facility is made before the cargo transfer piping is joined;

(c) The cargo hose is made of materials that are not attacked excessively by the cargo;

(d) The transfer connections have enough slack to allow for vessel movement;

(e) The transfer connections are supported by tackles;

(f) The cargo high level alarms are functioning correctly;

(g) Joints and couplings are gasketed and mated tightly;

(h) Flanges are bolted tightly;

(i) No repair work is underway in hazardous areas;

(j) Cargo and sea valves are properly set, with those sea valves connected to cargo piping lashed or sealed shut;

(k) Venting system valves are set for loading and are operating properly;

(l) All scuppers are plugged;

(m) Smoking is limited to safe places;

(n) Fire fighting and safety equipment is ready;

(o) He is in effective communication with the transfer terminal;

(p) The person in charge of the transfer terminal has acknowledged that he is ready to transfer;

(q) Pressures on the cargo transfer and containment systems are within their designed limits;

(r) No refrigerated or pressurized cargo is leaking, and any other leakage is contained by drip pan or bucket; and

(s) No vessels that would hazard cargo transfer are alongside the tankship.

§ 153.964 Supervision of cargo transfer.

The person in charge of cargo transfer shall supervise the operation of cargo system valves and monitor the cargo loading rate to avoid overfilling cargo tanks.

§ 153.966 Gauging with a sounding tube.

(a) No person may remove the cover of a sounding tube unless he has authorization from the person in charge of cargo transfer.

(b) The person in charge of cargo transfer may not authorize removal of the cover from a sounding tube gauge unless all tank pressure has been relieved through the tank's venting system.

§ 153.968 Termination procedures.

Upon completion of the transfer operation, the person in charge of cargo transfer shall ensure that—

(a) The cargo transfer connections are closed off;

(b) The transfer lines and hoses are drained of cargo, either into the tank or back to the transfer terminal;

(c) Any electrical bonding between the vessel and the shore facility is broken only after the cargo hose is disconnected and all spills removed; and

(d) Each vent system is returned to its nonloading configuration.

§ 153.970 Tank filling limitations.

The person in charge of cargo transfer shall ensure that the amount of cargo in a tank does not exceed the tank's capacity at any ambient temperature between −17.8° C. (approx. 0° F) and 46° C (approx. 115° F).

§ 153.977 Explosives.

No person may load, off-load, or carry a cargo listed in this part on board a vessel that carries explosives unless he has the written permission of the Commandant (G-MHM).

§ 153.978 Transfer of packaged cargo or ship's stores.

The person in charge of cargo transfer may neither begin nor continue the transfer of a flammable or combustible cargo while packaged cargo or ship's stores are transferred unless the transfer of packaged cargo or ship's stores does not hazard transfer of the flammable or combustible cargo.

§ 153.979 Illness, alcohol, drugs.

The senior deck officer may not use the services of any person who appears to be intoxicated by alcohol or drugs or appears to be so ill as to render him unfit for a particular service on the tankship.

SPECIAL CARGO PROCEDURES

§ 153.1000 Special operating requirements for cargoes reactive with water.

When Table I refers to this section, the senior deck officer must ensure that the cargo—

(a) Is carried only in a containment system completely isolated from any sys-

tems containing water, such as slop tanks, ballast tanks, cargo tanks containing slops or ballast, their vent lines or piping; and

(b) Is separated by double walls, such as cofferdams and piping tunnels, from any system containing water, as for example those described in paragraph (a) of this section.

§ 153.1010 Alkylene oxides.

(a) Before he loads a cargo containment system with an alkylene oxide, (i.e. a cargo referenced to this section in Table I), the person in charge of cargo transfer shall purge the containment system until the oxygen content of the cargo tank is less than 2 percent by volume.

(b) The person in charge of cargo transfer may not authorize the transfer of an alkylene oxide unless the ventilation or inert gas systems required by §§ 153.530(f) and (g) are operating.

(c) The person in charge of an alkylene oxide cargo transfer shall ensure that—

(1) No alkylene oxide vapor or liquid is released to the atmosphere during cargo transfer;

(2) No vapor return system connected to an alkylene oxide containment system is at the same time connected to another containment system;

(3) Alkylene oxide is discharged only by a deepwell pump or inert gas displacement;

(4) Transfer hose meets § 153.530(l) and is marked "For Alkylene Oxide Transfer Only"; and

(5) A water hose is laid out on deck with water pressure to the nozzle, and all alkylene oxide spillages are washed away immediately.

(d) After loading alkylene oxides, the person in charge of cargo transfer shall check the composition of the vapor space above the tank and purge the space with inert gas until the oxygen content is below 2% by volume.

§ 153.1011 Use of alkylene oxide containment systems and hoses with other products.

(a) An alkylene oxide may not be carried in a containment system that is endorsed to carry other cargoes unless the containment system is cleaned to the satisfaction of a Coast Guard marine inspector before the alkylene oxide is carried.

(b) No other cargo may be loaded into a containment system endorsed to carry an alkylene oxide unless the containment system has been cleaned of alkylene oxide to the satisfaction of a Coast Guard marine inspector.

(c) A hose marked "For Alkylene Oxide Transfer Only" may not be used for the transfer of another cargo.

§ 153.1020 Unusually toxic cargoes.

(a) The senior deck officer shall ensure that a heat transfer medium that has been circulated through a cargo referenced to this section in table I is not circulated through a cargo not referenced to this section unless he determines the medium to be uncontaminated with cargo; and

(b) No person may discharge overboard condensed steam from the heating system of a cargo referenced to this section in Table I unless he first determines the condensate to be uncontaminated with cargo.

§ 153.1025 Motor fuel antiknock compounds.

(a) No person may operate a tankship that carries any cargo in a containment system approved for motor fuel antiknock compounds containing lead alkyls except one to be used in the manufacture of motor fuel antiknock compounds.

(b) The senior deck officer shall ensure that no person enters a pumproom or void space that has piping from a containment system approved for motor fuel antiknock compounds containing lead alkyls unless the pumproom or void space atmosphere has been analyzed for its lead content and found to be less than 0.15 mg/m^3.

(c) No person may enter a cargo tank approved for motor fuel antiknock compounds containing lead alkyls without prior specific authorization of the Commandant (G-MHM).

§ 153.1035 Stabilization of acetone cyanohydrin.

No person may operate a tankship having on board acetone cyanohydrin unless the acetone cyanohydrin is stabilized with an inorganic acid.

§ 153.1040 Carbon disulphide.

(a) No person may load, carry, or discharge carbon disulphide unless the cargo tank has a water pad over the cargo of at least one meter (approx. 40 in.).

(b) No person may remove a cargo pump for a containment system that carries carbon disulphide unless—

(1) The containment system has a gas free certificate issued under the standards in § 35.01-1 of this chapter; or

(2) The vapor space in the pump well is filled with water.

§ 153.1045 Inorganic acids.

When Table I refers to this section, the person in charge of cargo transfer shall ensure that the legends "NO SMOKING" and "NO OPEN LIGHTS" are displayed on the warning sign required in § 153.952(a) when cargo is transferred.

§ 153.1046 Sulfuric acid.

No person may liquefy frozen or congealed sulfuric acid other than by external tank heating coils.

§ 153.1052 Carriage of other cargoes in acid tanks.

Another cargo may be carried in a cargo containment system endorsed to carry either sulfuric acid, hydrochloric acid, or phosphoric acid only with specific authorization from the Commandant (G-MHM).

§ 153.1055 Nitropropane.

(a) No person may load or carry 1- or 2-nitropropane in a tank having heating coils unless the heating coils have been isolated from their heat source by completely disconnecting them, for example, by inserting a blanking plate or by removing a spool piece in a steam supply line.

(b) No person may load or carry 1- or 2-nitropropane in a tank located in a hold or adjacent to a cargo whose temperature exceeds 40° C (approx. 104° F).

§ 153.1060 Inerted cargoes.

No person may operate a tankship having on board a cargo referenced to this section in Table I or transfer such cargo unless each inert gas system required for the cargo by this part is operating.

MAINTENANCE

§ 153.1500 Venting system rupture disks.

The senior deck officer shall ensure that a relief valve exposed to a cargo after the failure of a rupture disk or breaking pin is cleaned and found to operate properly before the next cargo is loaded into the tank.

§ 153.1502 Fixed ballast relocation.

No person may remove or relocate fixed ballast unless—

(a) The change is first approved by the Commandant (G-MMT); or

(b) The ballast is temporarily moved under the supervision of a marine inspector for examination or repair of the tankship.

§ 153.1504 Inspection of personnel emergency and safety equipment.

No person may operate a tankship unless the personnel emergency and safety equipment required by § 153.214 has been inspected within the previous 30 days and found in good condition and properly operating at the most recent inspection.

APPENDIX

TABLE II.—Bulk liquid cargoes that may be carried in vessels having neither a Certificate of Inspeciton under subchapter D (Tank Vessels) nor a permit under this part:

ammonium nitrate, urea, water solution, 2% or less NH_3
(2-chloro-4-ethylamino-6-ispropylamino - 5 - triazine, water solution)
hexamethylene diamine adipate
lignin liquor (calcium ligno-sulfonate, water solution)
methyl chloroform (1, 1, 1-trichloroethane)
perchloroethylene
pentasodium salt of diethylene triamine pentaacetic acid, water solution
tetrasodium salt of ethylene diamine tetraacetic acid, water solution
sodium lignosulfonates, sodium hydroxide (not exceeding 1% by weight), water solution
molasses
magnesium hydroxide suspensions in water
calcium chloride in water
urea in water
water
mixtures solely of the cargoes in this list.

Dated: June 14, 1976.

H. G. LYONS,
Captain, U.S. Coast Guard, Acting Chief, Office of Merchant Marine Safety.

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IMCO code:	Proposed regulations or explanation of no regulation
4.2.3(b)	154.436.
4.2.4	154.3(w).
4.2.4(a)	154.437 and 154.438.
4.2.4(b)	154.445.
4.2.4(c)	154.451 and 154.453.
4.2.5	154.3(o).
4.2.5(a)	154.405(b).
4.2.5(b)	154.405(a).
4.2.5(c)	154.405(c).
4.2.6	154.3(n).
4.3.1(a)	154.406(a).
4.3.1(b)	154.406(c).
4.3.1(c)	154.406(a) (10) and (11).
4.3.1(d)	154.406(b).
EEE	
4.3.2(a)	154.407(a).
4.3.2(b)	154.407(b).
4.3.3	154.408.
4.3.4(a)	154.409(a).
4.3.4(b)	154.409(c).
4.3.4(c)	154.409(d).
4.3.4(d)	154.409(e).
4.3.4(e)	Information only.
4.3.4(f)	154.409(f).
4.3.5(a)	154.410(a).
4.3.5(b)	154.410(b).
4.3.6(a)	154.411(a).
4.3.6(b)	154.411(b).
4.3.7	154.470.
4.4.1	154.420 (a) and (b).
4.4.2(a)	154.427(a).
4.4.2(b)	154.430 and 154.431.
4.4.2(c)	154.429(b).
4.4.2(d)	154.427(c).
4.4.2(e)	154.188, 154.427(d), 154.428, and 154.429(b).
4.4.3	154.435.
4.4.4(a)	154.439 (a) and (b) and 154.440(c).
4.4.4(b)	154.439(b)(2).
4.4.5(a)	154.444 and 154.448 (e) and (f).
4.4.5(b)	154.448(b).
4.4.5(c)	154.448(c).
4.4.5(d)	154.448(d).
4.4.5(e)	154.449.
4.4.5(f)	154.448(g).
4.4.6(a)(i)	154.450.
4.4.6(a)(ii)	154.450.
4.4.6(a)(iii)	154.104.
4.4.6(b)(i)	154.450.
4.4.6(b)(ii)	154.452.
4.4.6(c)(i)	154.450.
4.4.6(c)(ii)	154.450(a).
4.4.6(c)(iii)	154.450.
4.4.6(d)	154.450(b).
4.4.6(e)	154.450(c).
4.5.1(a)	154.421.
4.5.1(b)	154.428.
4.5.1(c)	154.440.
4.5.1(d)(i)	154.447(a).
4.5.1(d)(ii)	154.447(b).
4.5.1(e)	154.450.
4.5.1(f)(i)	154.401 and 154.630 (b) and (c).
4.5.1(f)(ii)	App. A.
4.5.1(f)(iii)	Do.
4.5.1(g)(i)	154.630(a).
4.5.1(g)(ii)	154.409(b).
4.5.2(a)	154.412 (a) and (b).
4.5.2(b)	154.412.
4.6.1	154.470(a) (1) and (2).
4.6.2	154.471(a) (1) and (2).
4.6.3	154.471(a)(4).
4.6.4	154.471(a)(3).
4.6.5	154.471(b).
4.6.6	154.470(b).
4.6.7	154.470(c).
4.7.1	154.459(a).
4.7.2(a)	154.449(d)(1).
4.7.2(b)	154.459(d)(2).
4.7.3	154.459 (a) and (e).
4.7.4(a)	154.460(a).
4.7.4(b)	154.460(b).
4.7.4(c)	154.460(c).
4.7.5	154.460.
4.7.6(a)	154.460.
4.7.6(b)	154.460.
4.7.7	154.136(j).
4.8.1	154.465 and 154.466(a).
4.8.2	154.466(b).
4.8.3	154.174 and 154.176.
4.8.4	Do.
4.8.4(a)	154.178(a).
4.8.4(b)	154.178(b).
4.8.4(c)	154.178.
4.8.4(d)	154.178(c).
4.8.5	Information only.
4.9.1	154.170 (a) and (d).
4.9.2	154.615 and 154.620.
4.9.3	154.615.
4.9.4	154.172.
4.9.5	154.466(c).
4.9.6	154.466(d).
4.9.7	154.467(a)(1) through (14).
4.9.8	154.467(a)(15).
4.9.9	154.466(e).
4.10.1(a)	154.650(c) (1) and (2).
41.0(b)(i)	154.650(d).
4.10.1(b)(ii)	154.650(d).
4.10.2	Information only.
4.10.3	154.650(e).
4.10.4	154.50 and 154.650(f).
4.10.5	154.50.
4.10.6	154.52.
4.10.7(a)	154.102(a) and 154.104(a).
4.10.7(b)(i)	154.102 (b), (c), and (d).
4.10.7(b)(ii)	154.104 (b), (c), and (d).
4.10.8(a)	154.54.
4.10.8(b)	154.56.
4.10.8(c)(i)	154.58(a)(1).
4.10.8(c)(ii)	154.58(a)(2).
4.10.8(c)(iii)	154.58(a)(3).
4.10.8(c)(iv)	154.58(b).
4.10.8(c)(v)	Information only.
4.10.8(c)(vi)	154.60.
4.10.8(c)(vii)	154.58(c) (1) and (2).
4.10.9	154.60.
4.10.10	154.62.
4.10.11	154.64.
4.10.12	154.110.
4.10.13	154.120.
4.10.14	154.122.
4.10.15	154.450.
4.11(a)	154.655 and 154.655(b).
4.11(b)(i)	154.655(a).
4.11(b)(ii)	154.655(a).
4.11.(b)(iii)	154.655(a).
4.11.(b)(iv)	154.655(a).
4.12(a)	154.409(c)(2)(i).
4.12(b)	154.409(c)(2)(ii).
4.12(c)	154.409(c)(2)(iii).
4.12(d)(i)	154.409(c).
4.12(d)(ii)	154.409(c).
4.13	App. B.
Ch. V	154.500 through 154.562.
5.1.1	Information only.
5.1.2	Do.
5.2.1(a)	154.500.
5.2.1(b)	154.503, 154.506, and 154.508(a).
5.2.2	154.512 and 154.516.
5.2.3	154.514.
5.2.4	154.517.
5.2.5	154.519.
5.2.6(a)	154.500.
5.2.6(b)(i)	154.500.
5.2.6(b)(ii)	154.500.
5.2.6(c)	154.500.
5.2.6(d)(i)	154.500.
5.2.6(d)(ii)	154.500.
5.2.6(e)	154.500.
5.2.7	154.520.
5.2.8(a)	154.522(a) (1) and (2).
5.2.8(b)	154.522(b).
5.2.9(a)	154.66 (a) and (b).
5.2.9(b)	154.68(a).
5.2.9(b)(i)	154.68(a)(2).
5.2.9(b)(ii)	154.68(a)(3).
5.2.9(b)(iii)	154.68(a)(1).
5.2.9(b)(iv)	154.68(a)(4).
5.2.9(b)(v)	Information only.
5.2.10(a)	Do.
5.2.10(b)(i)	154.524(a) (1), (2), and (3).
5.2.10(b)(ii)	154.524(b).
5.2.10(b)(iii)	154.524(c).
5.2.10(c)(i)	154.528(a).
5.2.10(c)(ii)(1)	154.526 and 154.528(c).
5.2.10(c)(ii)(2)	154.526 and 154.528(b).
5.2.10(d)	Information only.
5.2.10(e)(i)	154.508(b).
5.2.10(e)(ii)	154.508(a).
5.2.10(f)(i)	154.660(a).
5.2.10(f)(ii)	154.660(b).
5.2.10(f)(iii)(1)	154.660(c)(1).
5.2.10(f)(iii)(2)	154.660(c)(3).
5.2.11(a)	154.70.
5.2.11(b)(i)	154.70 (a), (b), and (c).
5.2.11(b)(ii)	154.72.
5.2.11(c)	154.74.
5.3.1(a)	154.530 (a) and (b).
5.3.1(b)	154.532 (a), (b), and (c).
5.3.1(c)	154.534.
5.3.2	154.536.
5.3.3	154.538 and 154.1866.
5.3.4	154.540, 154.542, and 154.544.
5.3.5	154.546, 154.548, and 154.550.
5.4.1	154.552.
5.4.2	154.554
5.4.3	154.556 and 154.558.
5.5.1	154.476(a).
5.5.2	154.476(b).
Ch. VI	154.605 through 154.665.
6.1.1	Information only.
6.1.2	Only applicable to code.
6.1.3	Information only.
6.1.4(a)	154.605(a).
6.1.4(b)	154.605(b).
6.1.5	Information only.
6.1.6	Do.
6.1.7	Do.
6.1.8	Do
6.1.9	154.172(a).
6.2	Only applicable to code.
Table 6.1	154.610 (a) through (g).
Table 6.2	Amended 46 CFR 54.25-10 and 154.615.
Table 6.3	154.620
Table 6.4	154.625
Table 6.5	154.172
6.3.1	154.650(a).
6.3.2	154.650(b).
6.3.3	154.665.
6.3.3(a)	154.665.
6.3.3(b)(i)	154.665.
6.6.6(b)(ii)	154.665.
6.3.3(b)(iii)	154.665.
6.3.3(b)(iv)	154.665.
6.3.4(a)	154.665.
6.3.4(b)	154.665.
6.3.4(c)	154.665.
6.3.5	154.665.
6.3.6(a)	154.76, 154.78, and 154.84.
6.3.6(b)(i)	154.80 (a) and (b).
6.3.6(b)(ii)	154.80(c).
6.3.6(c)	154.82.
6.3.6(d)	154.76 and 154.78.
6.3.7(a)(i)	154.94(a) and 154.96.
6.3.7(a)(ii)	154.94(b).
6.3.7(a)(iii)	154.100.
6.3.7(b)	154.102 and 154.104.
6.3.7(c)	154.90 and 154.92.
6.3.7(d)	154.106.
6.3.7(e)	154.108.
Ch. VII	154.701 to 154.709.

IMCO code:	Proposed regulations or explanation of no regulation
7.1.1	154.701(a).
7.1.1(a)	154.701(a)(1) and 154.703 (b) and (c).
7.1.1(b)	154.701(a).
7.1.1(c)	154.701(a)(2).
7.1.1(d)	Information only.
7.1.1(e)	154.1836.
7.1.2	154.701(a)(2) and 154.702(a)(1).
7.1.3	Information only.
7.2.1	154.702(a)(1).
7.2.2(a)	154.701(b).
7.2.2(b)	154.701(b).
7.2.2	154.702(d).
7.2.4(a)	154.1735 and 154.1750.
7.2.4(b)	154.1720.
7.2.4(c)	154.1735 and 154.1750.
7.2.5	154.702(e).
Ch. VIII	154.801 through 154.806.
8.1	Information only.
8.2.1	154.801 (a) and (b).
8.2.2	154.912.
8.2.3	154.801(c)(2).
8.2.4	154.801(c)(4) and (5).
8.2.5	154.66 (a) and (b), 154.801(c)(1) and (3), and 154.1846.
8.2.6(a)	154.802(a).
8.2.6(b)	154.802(b).
8.2.7	154.1846.
8.2.8(a)	154.801(c)(8)(i).
8.2.8(b)	154.801(c)(8)(ii).
8.2.8(c)	154.801(c)(8)(iii).
8.2.9	154.801(c)(6) and 154.805 (a), (b), and (d).
8.2.10	154.805 (e) and (f).
8.2.11	Information only.
8.2.12	154.801(c)(7).
8.2.13	154.805 (f) and (g).
8.2.14	154.805(c).
8.2.15	Information only.
8.2.16	154.801(c)(6).
8.2.17	154.801(c)(5).
8.3.1 and 8.3.2	None — unnecessary alternative requirements.
8.4.1	154.804(c).
8.4.2(a)	154.804(a)(1).
8.4.2(b)	154.804(a)(2)(i) and (ii).
8.4.2(c)	Information only.
8.4.3	154.804(a)(2)(iii).
8.4.4	154.804(b).
8.5	154.806.
8.5(a)	154.806(a).
8.5(b)	154.806(b).
Ch. IX	154.901 through 154.912.
9.1.1	154.901 (a) and (b).
9.1.2	154.901(d).
9.1.3	154.901(c).
9.1.4	154.901(a)
9.1.5	154.1848(b).
9.2.1	154.902(a).
9.2.2(a)	154.902(b).
9.2.2(b)	154.902(b).
9.2.3	154.902(c).
9.3	154.902(d).
9.4.1	154.903 (a) and (b).
9.4.2	154.1145.
9.4.3	154.903(c).
9.4.4	154.904(a).
9.4.5	154.904 (b) and (c) and 154.912.
9.5.1	154.906.
9.5.2	154.904 (a), (b), and (c).
9.5.3	154.908 (a) and 154.910.
9.5.4	154.908(b).
Ch. X	154.1000 through 154.1020.
10.1.1	154.1000.
10.1.2	Information only.
10.1.3	Do.
10.1.4	Do.
10.1.5	154.1005.
10.2	154.1010(a).
10.2.1	154.1010(b).
10.2.2	154.1010(c).
10.2.3	154.1010(d).
10.2.4	154.1010 (e) and (f).
10.2.4(a)	154.1010 (e)(1) and (f)(1).
10.2.4(b)	154.1010 (e)(2) and (f)(2) and 154.1015.
10.2.4(c)	154.1010(f)(6).
10.2.4(d)	154.1010(e) (3), (4), and (5) and (f) (3), (4), and (5).
10.2.4(e)	154.1010(f)(7).
10.2.5	154.1010(g).
10.2.5(a)	154.1010(g)(1) and 154.1015.
10.2.5(b)	154.315(b).
10.2.5(c)	Information only.
10.2.5(d)	154.1010(g)(2).
10.2.6	154.1010(j).
10.2.6(a)	154.1010(j)(1).
10.2.6(b)	154.1010(j)(2).
10.2.7(a)	154.1010 (h) and (i).
10.2.7(b)	Do.
10.2.8	154.1010(k).
10.2.9	154.345(c)(2).
Ch. XI	154.1100 through 154.1170.
11.1.1	154.1100.
11.1.2	154.1100.
11.2.1	154.1100.
11.2.2	154.1100.
11.2.3	Amended 46 CFR 34.10-15.
11.2.4	154.1100.
11.2.5	154.1100.
11.3.1	154.1105.
11.3.1(a)	154.1110(a).
11.3.1(b)	154.1110(b).
11.3.1(c)	1554.1110 (c) and (d).
11.3.1(d)	154.1110 (e), (f), and (g).
11.3.2	154.1115 and 154.1130 (a) and (b).
11.3.3	154.1125(c) and 154.1135.
11.3.4	154.1135(a)(3).
11.3.5	154.1125(d).
11.4.1	154.1140.
11.4.2	154.1145 and 154.1150 (a) and (b).
11.4.3	154.1145 (a)(1) and (c), 154.1150 (c), (d), and (e), and 154.1165 (a) and (b).
11.4.4	154.11565(c).
11.4.5	154.1170.
11.4.6	154.1145(b), 154.1155, and 154.1160.
11.4.7	154.1145(a)(2) and 154.1150 (a), (d), and (e).
11.5.1	Existing 46 CFR.
11.5.2	Do.
11.6.1	154.1400 (a) and (b).
11.6.2	Do.
Ch. XII	154.1200 through 154.1210.
12.1.1	154.1200 (a) and (b), 154.1205(f), and 154.1850.
12.1.2	154.1205 (c) and (d).
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12.1.5	154.1200(a).
12.1.6	154.1205(b).
12.1.7	154.1205(e).
12.1.8	154.1205(g).
12.1.9	154.1205 (h), (i), and (j).
12.1.10	Information only.
12.1.11	154.1205(k).
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Ch. XIII	154.1300 through 154.1375.
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13.1.2	154.1325(b), 154.1335(e)(2), and 154.1340(b).
13.1.3	Information only.
13.2.1	154.1305.
13.2.2	154.1300.
13.2.2(a)	Information only.
13.2.2(b)	Do.
13.2.2(c)	154.1310.
13.2.2(d)	154.1315.
13.2.3	154.1320(a).
13.2.4	154.1320 (b) and (c).
13.3.1	154.1325.
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13.4.3	154.1335(e).
13.4.4	154.1335(d) (1) and (2).
13.5.1	154.1340(a) and 154.1375.
13.5.2	154.1340(c).
13.5.3	154.1340 (d) and (e).
13.5.3(a)	154.1340(d).
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13.6.2	Do.
13.6.3	154.1350(c).
13.6.4	154.1350(g).
13.6.5	154.1350(m).
13.6.5(a)	154.1350(m)(1).
13.6.5(b)	154.1350(m)(2).
13.6.6	154.13.
13.6.7	154.1350(a).
13.6.7(a)	154.1350(a)(1).
13.6.7(b)	154.1350(a)(2).
13.6.7(c)	154.1350(a)(3).
13.6.7(d)	154.1350(a)(4).
13.6.7(e)	154.1350(a)(5).
13.6.7(f)	154.709.
13.6.7(g)	154.1350(a)(6).
13.6.8	154.1350 (h) and (n).
13.6.9	154.1828.
13.6.10	154.1350(d).
13.6.11	154.1350 (u) and (n).
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13.6.13	154.1345 (a)(2) and (b)(1).
13.6.14	154.1360.
Ch. XIV	154.1400 through 154.1445.
14.1	Information only.
14.2	154.1430.
14.3	154.1400 (a) and (b).
14.4	Do.
14.5	154.1400 (a)(2) and (b)(2) and 154.1415.
14.6	154.1430.
14.7	154.1852.
14.8	154.1420.
14.9	154.1425, 154.1435, and 154.1440.
Ch. XV	None—requirements located in other sections.
15.1.1	154.1844(a)(1).
15.1.2	154.1844(a)(2).
15.1.3	154.1844(a)(2).
15.1.4	None—unnecessary alternative requirements.
15.2	154.1810.
Ch. XVI	None—requirements located in other sections.
16.1	154.703.
16.2	154.706(a).
16.2(a)	154.706(a)(1).
16.2(b)	154.706(a)(2).
16.3	154.1854(b).
16.4	154.706(b).
16.5	154.707.
16.6	154.708 (a) and (b).
16.7	154.708(c).
16.8	154.705(b).
16.9	154.706(a)(2) and 154.707(b).
16.10	154.709.
16.11	Information only.
16.12	Do.
Ch. XVII	154.1700 through 154.1755.
17.1	Only applicable to code.
17.2.1	154.1405 (a) and (b).

IMCO code:	*Proposed regulations or explanation of no regulation*
17.2.2	154.1410 (a) and (b).
17.2.3	154.1400(c).
17.2.4	Information only.
17.2.5	Do.
17.3	154.1700.
17.4	154.1705.
17.5	154.1720, 154.1725, 154.1735, and 154.1750.
17.6	154.660(c)(2).
17.7	154.355(a)(2) and 154.1870(d).
17.8	154.1710.
17.9	154.1715.
17.10	154.1818.
17.11.1	154.1345(d).
17.11.2	154.1345(c).
17.12.1	154.1725 and 154.1730.
17.12.1(a)	154.1725(a)(1).
17.12.1(b)	154.1730(a)(2).
17.12.1(c)	154.1730(b).
17.12.1(d)	154.1725(c).
17.12.1(e)	154.1725(d).
17.12.1(f)	154.1725(e).
17.12.1(g)	154.1725(a) (2) and (3).
17.12.1(h)	154.1730(a).
17.12.2	154.1735.
17.12.3	154.1755.
17.12.4	154.1010.
17.12.5	Information only.
17.12.6	154.1740, 154.1745, and 154.1750.
Ch. XVIII	154.1800 through 154.1868.
18.1.1	154.1810 and 154.1814.
18.1.2	154.1818.
18.2	154.1820 and 154.1832.
18.3	Information only.
18.4	154.1850.
18.5	154.1810 and 154.1856.
18.6	154.1840.
18.7	154.1842.
18.8	154.1812, 154.1814, and 154.1822.
18.9	Only applicable to code.
Ch. XIX	Table 4.
Appendix	Standard Coast Guard form to be printed.

AMENDMENTS TO SUBCHAPTERS D AND F

Since Subchapters D and F are applicable to self propelled vessels that carry bulk liquefied gases, amendments are being proposed that would update those subchapters to conform to the Code.

LETTERS OF COMPLIANCE

An objective that the Coast Guard hoped to attain in the development of the Code was to terminate the plan review portion of the Letter of Compliance program for new foreign flag vessels.

The Code is substantially sufficient to ensure the Coast Guard that a new foreign flag gas vessel entering U.S. ports has been designed to the necessary standards. Therefore, the Coast Guard proposes that a new foreign flag vessel meet the proposed regulations or have an IMCO Certificate of Fitness, in addition to meeting the following design requirements in the proposed regulations, which differ from the Code:

1. Allowable stress in § 154.447 and § 154.450.
2. Crack arresting steels in § 154.170.
3. Ambient design temperatures in § 154.466.
4. Cargo temperature and pressure control in § 154.701 through § 154.709.

If the vessel has an IMCO Certificate of Fitness the Coast Guard would not require plan review. The Certificate of Fitness must be issued by or on behalf of the flag administration, and must have all information required in the Model Form of Certificate of Fitness for the Carriage of Liquefied Gases in Bulk, which is published in the Appendix to the Code. It is proposed to require submission of a copy of the Certificate of Fitness to the Coast Guard before the vessel arrives in a U.S. port.

It is also proposed that in addition to the IMCO Certificate of Fitness, the following plans and information, in English, must be submitted to the Coast Guard before a vessel arrives in a U.S. port with a bulk liquefied gas cargo. These plans and information would be retained in the Coast Guard's files for use during vessel examinations and in any emergency that the vessel may encounter while in a U.S. port:

1. Description of the vessel.
2. Specifications for the cargo containment system.
3. General arrangement of the vessel.
4. Midship section of the vessel.
5. Schematic plans of the liquid and vapor cargo piping.
6. Firefighting and safety plan.

A foreign flag vessel is examined at its first U.S. port of call under 46 CFR Part 154. A 2 week notification to the Coast Guard of the vessel's arrival at the first U.S. port of call is also required. The information for the notification must include the following:

1. The first part of call.
2. The cargoes carried.
3. The estimated arrival date.
4. The vessel's agent.
5. The berthing facilities for the vessel.

It is proposed that the following information, in English, be carried on board these foreign flag vessels for Coast Guard use during examinations:

1. A description and schematic plan of the arrangement for inerting cargo tanks, hold spaces, and interbarrier spaces.
2. A description of the tank gauging equipment.
3. A description and instruction manual for the calibration of the cargo leak detector equipment.
4. A schematic plan that shows the locations of leak detectors and sampling points.
5. A description of the systems for cargo temperature and pressure control for methane to meet proposed § 154.701 through § 154.709.

If the proposed regulations are adopted by the Coast Guard, there will be many gas vessels that do not have Letters of Compliance and cannot receive IMCO Certificates of Fitness as new vessels. Included in this group are 120 ships now under review by the Coast Guard for Letters of Compliance. Each gas vessel that has applied for a Letter of Compliance since March 11, 1975, has been required by the Coast Guard to meet the Code. Vessels that are under construction, but applied for a Letter of Compliance before March 11, 1975, are being required by the Coast Guard to meet the Code insofar as it is possible, taking into consideration the stage of each vessel's construction.

Existing foreign flag gas vessels (i.e., foreign flag vessels that are not new foreign flag gas vessels) that are now in service and have never undergone plan review for a Letter of Compliance will have to comply with the standards of the Letter of Compliance program in effect at the time of their construction, as well as any additional requirements that may be established by future regulations concerned with existing gas vessels.

Existing U.S. gas vessels (i.e., U.S. vessels that are not new U.S. gas vessels) would continue to meet the requirements in Subchapters D and I as well as any additional requirements established by future regulation concerned with existing ships.

The Coast Guard has determined that the proposed regulations would have no foreseeable significant impact on the quality of the human environment. An environmental assessment with a negative declaration has been prepared. Copies may be obtained in Room 8117, Coast Guard Headquarters, Washington, D.C. 20590.

The Coast Guard has determined that this proposal is not a major proposal in accordance with Department of Transportation Policies to Improve Analysis and Review of Regulations—Regulatory Reform, as published in the April 16, 1976 issue of the FEDERAL REGISTER (41 FR 16200) and DOT Order 2050.4 dated February 2, 1976. Therefore, an economic evaluation and a negative declaration of inflationary impact are required.

The economic evaluation for this proposal shows that for each of the next seven fiscal years the proposed regulations would result in the following:

(a) A decreased expenditure of about $0.2 million by the Federal government, and no significant impact on state and local governments.

(b) An increase cost of $21.6 million to consumers businesses and industry.

(c) No significant impact on energy consumption, important materials or employment.

The benefits to the public of the proposal include:

(1) A consolidation of design and equipment regulations for various liquefied gas ships in one part.

(2) Incorporation of an internationally agreed standard for liquefied gas ships with clarification, where possible, of portions of that standard (the IMCO Gas Code) that are left to the "satisfaction of the Administration." This phrase is used often in the IMCO Gas Code, and, in the case of the U.S., refers to the U.S. Coast Guard.

(3) Codification of existing and additional requirements for the design, construction, and operation of liquefied gas ships.

A quantitative analysis of benefit to the public is difficult to assess due to the excellent safety record of liquefied gas ships. However, it is clear that the adoption of an international standard that further increases the level of safety of gas ships is beneficial to the public in-

terest. U.S. gas ship owners and operators will benefit in having an internationally accepted Certificate to facilitate their vessels' operation in foreign ports.

Copies of the economic evaluation and negative declaration of inflationary impact are available upon request to the Executive Secretary (G-CMC/81), Coast Guard Headquarters, Washington, D.C. 20590.

The close cooperation with the Chemical Transportation Industry Advisory Committee, the acceptance of an international code containing similar provisions, and the fact that many liquefied gas ships throughout the world and in the United States are already being built to these standards ensures their technological and economic feasibility.

In consideration of the foregoing, it is proposed to amend Chapter I of Title 46, Code of Federal Regulations, as follows:

PART 31—INSPECTION AND CERTIFICATION

1. By amending Part 31 by adding § 31.10–18a to read as follows:

§ 31.10–18a Liquefied gas vessels: Additional firefighting equipment inspections.

(a) Once during each 12 month period after the month an original certificate of inspection is issued for a liquefied gas vessel under § 31.05–1, the master shall ensure that the firefighting systems required in Part 154 of this chapter for a liquefied gas vessel meets the following:

(1) The exterior water spray system must pass a water spray test.

(2) The dry chemical system must meet the manufacturer's specifications for—

(i) The amount of dry chemical powder; and

(ii) The pressure for nitrogen bottles.

(3) The piping, valves, and controls of the system must be operable.

(b) On the date that the requirements under paragraph (a) are met, the master shall record in the vessel's official logbook the following information:

(1) The date of the inspection.

(2) The identification of each device inspected.

(3) The name of the inspector.

PART 34—FIREFIGHTING EQUIPMENT

§ 34.10–15 [Amended]

2. By amending § 34.10–15 as follows:

a. In paragraph (b), by adding after the word "piping" the words ", except on self propelled vessels carrying bulk liquefied gases that must have stop valves—

(1) At cross connections;

(2) At the front of the after deck house; and

(3) In the cargo area spaced 40 m (131 ft.) or less between hydrants."

b. In paragraph (e), by adding after the word "approximately" the words "71 pounds per square inch on self propelled vessels that carry bulk liquefied gases and approximately", and by adding after "50 pounds per square inch" the words "on other tankships".

PART 40—SPECIAL CONSTRUCTION, ARRANGEMENT, AND OTHER PROVISIONS FOR CARRYING CERTAIN FLAMMABLE OR COMBUSTIBLE DANGEROUS CARGOES IN BULK

Subpart 40.05—[Revoked]

3. By revoking Subpart 40.05.

PART 54—PRESSURE VESSELS

4. By amending § 54.15–25 by revising paragraph (c) and adding paragraph (c–1) to follow paragraph (c) to read as follows:

§ 54.15–25 Minimum relief capacities for cargo tanks containing compressed or liquefied gas.

• • • • •

(c) The rate of discharge for heat input of fire must meet the following formula:

$$Q = FGA^{0.82}$$

Where:

Q = Minimum required rate of discharge in cubic meters (cubic feet) per minute of air at standard conditions of 0° C and 1.03 kp/cm² (60° F and 14.7 psia).

F = Fire exposure factor for the following tank types:

F = 1.0 for tanks without insulation located on the open deck.

F = 0.5 for tanks on the open deck having insulation that has approved fire proofing, thermal conductance, and stability under fire exposure.

F = 0.5 for uninsulated independent tanks installed in holds.

F = 0.2 for insulated independent tanks in holds or for uninsulated independent tanks in insulated holds.

F = 0.1 for insulated independent tanks in inerted holds or for uninsulated independent tanks in inerted, insulated holds.

F = 0.1 for membrane and semi-membrane tanks.

G = Gas factor of:

$$G = \frac{177}{LC}\sqrt{\frac{ZT}{M}} \left(G = \frac{633{,}000}{LC}\sqrt{\frac{ZT}{M}}\right)$$

Where:

L = Latent heat of the material being vaporized at relieving conditions, in Kcal/kg (Btu per pound).

C = Constant based on relation of specific heats (k) Table § 54.14–25(c) (if k is not known C = .606 (315) is used).

Z = Compressibility factor of the gas at relieving conditions (if not known, Z = 1.0 is used).

T = Temperature in degrees K = (273+ degrees C) (R = (460+ degrees F)) at the relieving conditions (120% of the pressure at which the pressure relief valve is set).

M = Molecular weight of the product.

A = External surface area of the tank in m² (sq. ft.) for the following tank types:

For a tank of a body of revolution shape:

A = External surface area.

For a tank other than a body of revolution shape.

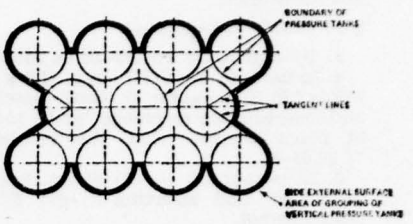
A = External surface area less the projected bottom surface area.

For a grouping of pressure vessel tanks having insulation on the vessel's structure:

A = External surface area of the hold without the projected bottom area.

For a grouping of pressure tanks having insulation on the tank:

A = External surface area of the pressure tanks excluding insulation, and without the projected bottom area.[1]



SIDE EXTERNAL SURFACE AREA OF GROUPING OF VERTICAL PRESSURE TANKS

Figure 54.15–25 (c)

TABLE 54.15–25(c).—*Constant C*

k	C
1.00	.606 (315)
1.02	.611 (318)
1.04	.615 (320)
1.06	.620 (322)
1.08	.624 (324)
1.10	.628 (327)
1.12	.633 (329)
1.14	.637 (331)
1.16	.641 (333)
1.18	.645 (335)
1.20	.649 (337)
1.22	.652 (339)
1.24	.656 (341)
1.26	.660 (343)
1.28	.664 (345)
1.30	.667 (347)
1.32	.671 (349)
1.34	.674 (351)
1.36	.677 (352)
1.38	.681 (354)
1.40	.685 (356)
1.42	.688 (358)
1.44	.691 (359)
1.46	.695 (361)
1.48	.698 (363)
1.50	.701 (364)
1.52	.704 (366)
1.54	.707 (368)
1.56	.710 (369)
1.58	.713 (371)
1.60	.716 (372)
1.62	.719 (374)
1.64	.722 (376)
1.66	.725 (377)
1.68	.728 (379)
1.70	.731 (380)
1.72	.734 (382)
1.74	.736 (383)
1.76	.739 (384)
1.78	.742 (386)
1.80	.745 (387)
1.82	.747 (388)
1.84	.750 (390)
1.86	.752 (391)
1.88	.755 (392)
1.90	.758 (394)
1.92	.760 (395)
1.94	.763 (397)
1.96	.765 (398)
1.98	.767 (399)
2.00	.770 (400)
2.02	.772 (401)
2.20	.792 (412)

[1] Figure 54.15–25(c) shows a method of determining the side external surface area of a grouping of vertical pressure tanks.

(c-1) For an independent tank that has a portion of the tank protruding above the open deck, the fire exposure factor must be calculated for the surface area above the deck and the surface area below the deck, and the calculation must be specially approved by the Commandant (G-MMT).

§ 54.25-10 [Amended]

5. By amending § 54.25-10 as follows:

a. In paragraph (a)(1), by striking the words "in Subchapter D (tank vessels)" and inserting the reference "and § 154.3" in place thereof after the reference "§ 38.05-4".

b. In paragraph (b)(1)(i) by striking "—70° F" and inserting "—67° F" in place thereof.

c. In table 54.25-10(b)(1) in the column entitled "Minimum service[1] temperature °F", by striking "—70" and inserting "—67" in place thereof, and in the column entitled "Manganese range[1] percent" by striking "0.90" and inserting "0.70" in place thereof, and by striking "1.65" and inserting "1.60" in place thereof,

d. By striking the columns following footnote 1 of Table 54.25-10(b)(1) and inserting the following two columns in place thereof:

	Range percent
Si	0.10–5.50
	Maximum
S	0.35
P	.35
Ni	.80
Cr	.25
Mo	.08
Cu	.35
Nb	.05
V	.08

e. In paragraph (b)(2), by striking "—70° F" and inserting "—67° F" in place thereof.

6. By striking in the second sentence in § 56.50-105(a) the words "Subchapter D (Tank Vessels) and I (Cargo and Miscellaneous Vessels)" and inserting "Subchapters D, I, and O" in place thereof.

PART 98—SPECIAL CONSTRUCTION, ARRANGEMENT, AND OTHER PROVISIONS FOR CERTAIN DANGEROUS CARGOES IN BULK

Subpart 98.25—[Revoked]

7. By revoking Subpart 98.25.

8. By redesignating Part 154—Special Interim Regulations for Issuance of Letters of Compliance as an appendix to Subchapter O.

9. By adding a new Part 154 to read as follows:

PART 154—SAFETY STANDARDS FOR SELF PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES

Subpart A—General

Sec.

154.1 Applicability.
154.3 Definitions.
154.4 U.S. Flag Vessel Endorsement Application.
154.5 Foreign Flag Vessel Endorsement Application.
154.6 U.S. Flag Certificate Endorsement.
154.8 Equivalents.
154.10 Conflict in regulations.

Subpart B—Inspections and Tests

ORIGINAL CERTIFICATE OF INSPECTION REQUIREMENTS

154.40 Purpose.
154.50 Integral tanks: Pressure test.
154.52 Membrane or semi-membrane tanks: Pressure test.
154.54 Independent tank type A: Pressure test.
154.56 Independent tank type B: Pressure test.
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Appendix A—Equivalent Stress
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AUTHORITY: Regulations for dangerous cargoes issued under R.S. 4472, as amended (46 U.S.C. 170) except those for flammable and combustible liquids issued under sec. 201, 86 Stat. 427, as amended (46 U.S.C. 391a); the functions, powers, and duties relating to the Coast Guard under R.S. 4472, as amended, transfered to the Department under sec. 6(b)(1), 80 Stat. 937 (49 U.S.C. 1655(b)(1)); 46 U.S.C. 170 delegated to the Coast Guard under 49 CFR 1.46 (b) and (t), 46 U.S.C. 391a delegated to the Coast Guard under 49 CFR 1.46(n)(4).

Subpart A—General

§ 154.1 Applicability.

The regulations in this part apply to a self-propelled vessel that has on board bulk liquefied gases as a cargo, cargo residue, or vapor and that—

(a) Is constructed under a building contract awarded after October 31, 1976;

(b) In the absence of a building contract, has the keel laid or is at a similar stage of construction after December 31, 1976;

(c) Is delivered after June 30, 1980; or

(d) Has undergone a major conversion for which—

(1) The building contract is awarded after October 31, 1976;

(2) In the absence of a building contract, conversion is begun after December 31, 1976; or

(3) Conversion is completed after June 30, 1980.

§ 154.3 Definitions.

As used in this part:

(a) "'A' Class Division" means a division as defined in Regulation 3 of Chapter II–2 of the 1974 Safety Convention.

(b) "Accommodation spaces" means public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, pantries containing no cooking appliances, and similar spaces. Public spaces are those portions of the accommodations that are used as halls, dining rooms, lounges, and similar permanently enclosed spaces.

(c) [Reserved]

(d) "Boiling point" means the temperature at which a cargo exhibits a vapor pressure equal to the atmospheric barometric pressure.

(e) "Breadth (B)" means the maximum width of the vessel in meters measured admidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

(f) "Cargo area" means that part of the ship which contains the cargo containment system and includes the deck areas over the full beam and length of the ship above the foregoing. The cofferdams, ballast or void spaces at the after end of the aftermost hold space or the forward end of the forwardmost hold space are excluded from the cargo area.

(g) "Cargo containment system" means the arrangement for containment of cargo including a primary and secondary barrier, associated insulation and any intervening spaces, and adjacent structure if necessary for the support of these elements. If the secondary barrier is part of the hull structure it may be a boundary of the hold space.

(h) "Cargo service space" means a space within the cargo area used for work shops, lockers, and store rooms of more than 2 m^2 (21.8 $ft.^2$) in area.

(i) [Reserved]

(j) "Cofferdam" means the isolating space between two adjacent steel bulkheads or decks. This space may be a void space or ballast space.

(k) "Commandant" means the Commandant of the Coast Guard.

(l) "Contiguous hull structure" means hull srtucture that includes the inner bottom plating, longitudinal bulkhead plating, transverse bulkhead plating, floors, webs, stringers, and attached stiffeners.

(m) "Control space" means those spaces in which the vessel's radio or main navigating equipment or the emergency source of power is located or where the fire control equipment is centralized.

(n) "Design temperature" means the minimum temperature at which cargo may be loaded, unloaded, or carried.

(o) "Design vapor pressure (P_o)" means the maximum gauge pressure at the top of tank used in the design of the tank.

(p) "Essential auxiliary" means a piece of equipment or system that is vital to the safe operation of the vessel.

(q) "Flammable cargoes" means the following liquefied gases from Table I:

Acetaldehyde	Methane (LNG)
Butadiene	Methyl acetylene-propadiene mixture
Butane	
Butylene	
Dimethylamine	Methyl bromide
Ethane	Methyl chloride
Ethylamine	Propane
Ethyl chloride	Propeylene
Ethylene	Vinyl chloride
Ethylene oxide	

(r) "Flammable range" means the range between the minimum and maximum concentrations of vapor in air which form a flammable mixture.

(s) "Gas-dangerous space" means:

(1) A space in the cargo area that does not have approved arrangements to ensure that its atmosphere is at all times maintained in a safe condition.

(2) An enclosed space outside the cargo area through which any piping that may contain liquid or gaseous cargo passes, or within which such piping terminates, unless it has approved arrangements are installed to prevent any escape of gas into the atmosphere of that space.

(3) A cargo containment system and cargo piping.

(4) A hold space.

(5) A space separated from the hold space defined in paragraph (u) of this section by a single gastight steel boundary.

(6) A cargo pumproom and a cargo compressor room.

(7) A zone on the open deck, or semi-enclosed space on the open deck, within 3 m (10 ft.) of any cargo tank outlet, gas or vapor outlet, cargo pipe flange, cargo valve, or of entrances and ventilation openings to a cargo pump room and cargo compressor room.

(8) The open deck over the cargo area and 3m (10 ft.) forward and aft of the cargo area on the open deck up to a height of 2.4 m (8 ft.) above the weather deck.

(9) A zone within 2.4 m (8 ft.) of the outer surface of a cargo containment system where the surface is exposed to the weather.

(10) An enclosed or semi-enclosed space in which there are lines containing cargo except gas sampling lines led to gas detection equipment under § 154.1350(m) or a space that uses boil-off gas as fuel and complies with § 154.703.

(11) A space for cargo hoses.

(12) An enclosed or semi-enclosed space having a direct opening into any gas-dangerous space or zone, as defined in subparagraphs (1) through (11) of this paragraph.

(t) "Gas-safe space" means a space that is not a gas-dangerous space.

(u) "Hold space" means the space enclosed by the vessel's structure in which there is a cargo containment system.

(v) [Reserved]

(w) "Independent tank" means a self supporting tank that is not a part of the ship's hull and is not essential to the hull strength.

(x) "Insulation space" means a space that may or may not be an interbarrier space, occupied wholly or in part by insulation.

(y) "Interbarrier space" means the space between a primary and a secondary barrier, whether or not completely or partially occupied by insulation or other material.

(z) "Integral tank" means a tank that forms a structural part of the vessel's hull and is influenced in the same manner and by the same loads that stress the adjacent hull structure.

(aa) "Length (L)" means ninety-six percent of the total length in meters on a waterline at eighty-five percent of the least molded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, whichever is greater. In vessels designed with a rake of keel the waterline on which this length is measured must be parallel to the designed waterline.

(bb) "Marine Inspector" means any person designated for the performance of duties with respect to the enforcement and administration of Title 52, R.S.,

acts amendatory thereof or supplemental thereto, rules and regulations thereunder, and the inspections required thereby.

(cc) "MARVS" means the Maximum Allowable Relief Valve Setting of a cargo tank.

(dd) "Membrane tank" means a tank that is non-self-supporting and consists of a thin layer (membrane) supported through insulation by the adjacent hull structure.

(ee) "Permeability of a space" means the ratio of the volume within that space that is assumed to be occupied by water to the total volume of the space.

(ff) "Primary barrier" means the inner element designed to contain the cargo when the cargo containment system included two boundaries.

(gg) "Secondary barrier" means the liquid resisting outer element of a cargo containment system designed to afford containment of any envisioned leakage of liquid cargo through the primary barrier for 15 days and to prevent the lowering of the temperature of the ship's structure to an unsafe level.

(hh) "Semi-membrane" tank means a tank that is non-self supporting in the loaded condition and consists of flat surfaces supported through insulation by the adjacent hull structure, and of shaped corners that connect the flat surfaces that can expand and contract due to thermal, hydrostatic, and pressure loadings.

(ii) "Service space" means a space outside the cargo area used for a galley, pantry containing cooking appliances, locker or store room, workshop other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces.

(jj) "Shut off valve" means a valve that fully closes a pipeline and provides nominal metal to metal contact between the valve operating parts, including the disc and gate, and the valve body.

(kk) "Specific gravity" means the ratio of the density of the cargo, at the lowest temperature at which it may be carried, to the density of water at 4° C (39° F).

(ll) "Tank" means the liquid tight shell designed to be the primary container of the cargo and includes all such containers whether or not associated with insulation or secondary barriers.

(mm) "Tank cover" means the protective structure intended to protect the cargo containment system against damage where it protrudes through the weather deck and to ensure the continuity and integrity of the deck structure.

(nn) "Tank dome" means the upward extension of a portion of the cargo tank. For below deck cargo containment systems the tank dome protrudes through the weather deck or through a tank cover.

(oo) "Toxic cargoes" means the following liquefied gases from Table 4:

Acetaldehyde	Ethylene oxide
Ammonia	Methyl bromide
Dimethylamine	Methyl chloride
Ethylamine	Sulfur dioxide
Ethyl chloride	Vinyl chloride

(pp) "Vapor density" means the relative weight of the vapor compared with the weight of an equal volume of dry air at standard conditions of temperature and pressure.

(qq) "Vapor pressure" means the absolute equilibrium pressure of the saturated vapor above the liquid expressed in kp/cm² (psia) at a specified temperature.

(rr) "Void space" means an enclosed space in the cargo area external to a cargo containment system, which is not a hold space, ballast space, fuel oil tank, cargo pump or compressor room, or any space used by personnel.

(ss) "1974 Safety Convention" means the International Convention on Safety of Life at Sea, 1974.

(tt) "Liquefied gas" means a cargo having a vapor pressure of 1.76 kp/cm² (25 psia) or more at 37.8° C (103° F).

(uu) "Recognized classification society" means a non-government association that has issued standards accepted by the Commandant.

§ 154.4 U.S. flag vessel endorsement application.

(a) A person who desires the endorsement required by § 154.6 for a U.S. flag vessel must submit an application described in § 91.55-15 of this chapter for an endorsement of the vessel's subchapter D Certificate of Inspection.

(b) The person requesting an endorsement under paragraph (a) of this section must submit to the Coast Guard when requested—

(1) Hull type calculations required by § 154.201;

(2) The plans and information listed in §§ 54.01-18, 56.01-10, 91.55-5 (a), (b), (d), (g), and (h); and 111.05-5(d) of this chapter; and

(3) Any other vessel information, such as plans, design calculations, test results, certificates, and manufacturer's data, that the Coast Guard needs to determine whether or not the vessel meets the standards of this part.

§ 154.5 Foreign flag vessel endorsement application.

(a) A person who desires an endorsement on the Letter of Compliance required by § 154.1802 for a foreign flag vessel must submit an application to the Commandant (G-MHM) that includes—

(1) A list of cargoes for which the endorsement is requested;

(2) The names of the U.S. ports in which the person anticipates operating the vessel;

(3) The vessel's country of registry;

(4) A copy of the Certificate of Fitness for the Carriage of Liquefied Gases in Bulk issued under the IMCO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, if the vessel holds such a certificate;

(5) The name of the society that classes the vessel;

(6) A brief description of the vessel's cargo containment systems;

(7) Plans, calculations, or other information to show compliance under §§ 154.170, 154.447, 154.450, 154.466, and 154.701 through 154.709; and

(8) The following plans and information:

(i) Description of the vessel.

(ii) Specifications for the cargo containment system.

(iii) General arrangement of the vessel.

(iv) Midship section of the vessel.

(v) Schematic plans of the liquid and vapor cargo piping.

(vi) Firefighting and safety plan.

(b) All correspondence and vessel information must be in English.

(c) If the vessel does not have a Certificate of Fitness issued under the IMCO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, adopted without amendments on November 12, 1975 by Assembly Resolution A.328(IX), the plans, calculations and information required by § 154.4(b) must be submitted to the Commandant (G-MHM).

§ 154.6 U.S. flag certificate endorsement.

(a) The Certificate of Inspction for a vessel intended to carry any liquefied gas is endorsed for each individual cargo as follows:

Inspected and approved for the carriage of (enter the applicable cargo name) at a maximum allowable relief valve setting of _____ kp/cm² (_____ psig) with an F factor of _____, a maximum external pressure of _____ kp/cm² (_____ psig), a minimum service temperature of ____ °C (____ °F), and a maximum specific gravity of _____. Hull type _____.

(b) The Commandant (G-MVI) also issues an IMCO Certificate of Fitness showing compliance with the IMCO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, Resolution A.328(ix), if requested by the vessel owner or operator.

§ 154.8 Equivalents.

(a) Where a vessel must have a particular fitting, material, appliance, apparatus, equipment, provision, procedure, or arrangement, including cargo segregation, the Commandant may accept any other fitting, material, appliance, apparatus, equipment, provision, procedure, or arrangement, that he determines to be as effective as that specified in this part.

(b) In any case where it is shown to the satisfaction of the Commandant (G-MMT) that the use of any particular equipment, apparatus, or arrangement not specifically required by statute, but prescribed by regulations is unreasonable or impracticable, the Commandant (G-MMT) may allow the use of alternate equipment, apparatus, or arrangement to such an extent and upon such conditions as will insure a degree of safety consistent with the minimum standards set forth in this part.

(c) Operational methods or procedures must not be substituted for a particular fitting, material, appliance, apparatus, item of equipment, or type thereof specified in this part.

§ 154.10 Conflict in regulations.

(a) When a specific requirement in another part of this schapter is in conflict with any requirement in this part, the regulations in this part take precedence.

(b) When a vessel carries cargoes regulated by this part and by another part, the requirements of both parts must be met.

Subpart B—Inspections and Tests

ORIGINAL CERTIFICATE OF INSPECTION REQUIREMENTS

§ 154.40 Purpose.

Sections 154.50 through 154.122 prescribe the original test and inspection requirements for the cargo containment system, process pressure vessels, cargo and process piping, hull heating, and cold spots on liquefied gas vessels for the issuance of an original certificate of inspection for the vessel.

§ 154.50 Integral tanks: Pressure test.

An integral tank must pass in the presence of a marine inspector, a hydrostatic or hydropneumatic test that—

(a) Approximates the design stresses; and

(b) Has a pressure at the top of the tank at least equal to the MARVS.

§ 154.52 Membrane or semi-membrane tanks: Pressure test.

(a) The following pressure test procedures for a membrane or semi-membrane tank must be specially approved by the Commandant (G-MMT):

(1) Hydrostatically, hydropneumatically, or pneumatically testing the tank and any space adjacent to the hull structure that supports the membrane and contains liquid.

(2) Pneumatically testing the hold structure, the pipe tunnel, and any space adjacent to the hull structure that supports the membrane and does not contain liquid.

(b) A membrane or semi-membrane tank must pass, in the presence of a marine inspector, the hydrostatic, hydropneumatic, or pneumatic test specially approved by the Commandant (G-MMT).

§ 154.54 Independent tank type A: Pressure test.

An independent tank type A must pass, in the presence of a marine inspector, one of the following:

(a) A hydrostatic test that—

(1) Approximates the design stresses; and

(2) Has a pressure at the top of the tank at least equal to the MARVS; or

(b) A hydropneumatic test that—

(1) Approximates the service loading of the tank and its supports;

(2) Approximates the design stresses; and

(3) Has a pressure at the top of the tank at least equal to the MARVS.

§ 154.56 Independent tank type B: Pressure test.

Each independent tank type B must pass, in the presence of a marine inspector, a hydrostatic, or a hydropneumatic test that—

(a) Approximates design stresses;

(b) Has a pressure at the top of the tank at least equal to the MARVS;

(c) Has maximum primary membrane stress and maximum bending stress in primary members of less than 90 percent of the yield strength of the fabricated material at the test temperature; and

(d) Has strain gauges or other equipment to monitor the prototype tank during the test if the calculated test stresses exceed 75 percent of the yield strength of the fabricated material.

§ 154.58 Independent tank type C: Pressure test.

(a) An independent tank type C and a process pressure vessel must pass, in the presence of a marine inspector, a hydrostatic test that meets the following requirements:

(1) Section 54.10-10 of this chapter.

(2) The water temperature for the test must be at least 30° C (54° F) warmer than the nil ductility transition temperature of the fabricated material.

(3) The test pressure must be applied for a period of at least—

(i) Two hours; and

(ii) Five minutes for each additional mm of thickness for tank plating greater than 25 mm (1 in.).

(b) If a tank cannot be safely filled with water to meet the requirements under paragraph (a) of this section, the tank must, pass, in the presence of a mine inspector, a hydropneumatic test that is specially approved by the Commandant (G-MMT).

(c) A process pressure vessel must pass, in the presence of a marine inspector, the pneumatic test under § 54.10-15 of this chapter if—

(1) The vessel cannot be safely filled with water to meet the requirements under paragraph (a) of this section; or

(2) The water for the test under paragraph (a) of this section cannot be removed and traces of this water cannot be tolerated during the service of the vessel.

§ 154.60 Cargo tanks: Weld tightness test.

A tank must pass, in the presence of a marine inspector, one of the following weld tightness tests:

(a) Soap bubble test.

(b) Vacuum box test.

(c) A tightness test specially approved by the Commandant (G-MMT).

§ 154.62 Secondary barrier: Weld tightness test.

A secondary barrier for a tank must pass, in the presence of a marine inspector, one of the following tightness tests:

(a) Soap bubble test.

(b) Vacuum box test.

(c) A tightness test specially approved by the Commandant (G-MMT).

§ 154.64 Independent tanks type B: Stress level test.

(a) One independent tank type B and its supports on the first vessel of a class of vessels must have strain gauges to record stress levels during the pressure test after the tank is in the vessel and for the 24 months of service.

(b) The records from the strain gauges required under paragraph (a) of this section must be maintained for the first 24 months that the vessel is in service.

(c) The strain gauge records required under paragraph (b) of this section must be analyzed and specially approved by the Commandant (G-MMT) after the first thirty months that the vessel is in service.

§ 154.66 Cargo and process piping valves: Tightness test.

(a) At least one of each size and type of value in the cargo and process piping systems used at a working temperature lower than −55° C (−67° F) must be tested, including actuation, to at least the minimum design temperature and the maximum design pressure.

(b) A report of the test under paragraph (a) of this section must be specially approved by the Commandant (G-MMT).

§ 154.68 Expansion bellows: Cycles and pressure tests.

(a) The expansion bellows in a cargo system must be approved under § 56.35-15(e) of this chapter or tested as follows:

(1) At least one of each type of expansion bellows in the system must be tested under § 56.35-10 and § 56.35-15 of this chapter;

(2) At least one of each type of element in the expansion bellows, not precompressed, must pass a pressure test of at least five times the design pressure for at least five minutes without bursting.

(3) At least one type of expansion joint with flanges, stays, articulations, and all other accessories, must pass a pressure test under § 56.97-5 of this chapter without permanent deformation at—

(i) Twice the design pressure;

(ii) The extreme displacement conditions recommended by the manufacturer; and

(iii) The minimum design temperature.

(4) If an expansion joint is subject to vessel deformation loads, the expansion joint must pass a cyclic fatigue test—

(i) For at least 2,000,000 cycles at a frequency not higher than five cycles/second;

(ii) By simulating a bellows movement equal to a compensated pipe length; and

(iii) Without internal pressure.

(b) A report of the tests under paragraph (a) of this section must be specially approved by the Commandant (G-MMT).

§ 154.70 Cargo and process piping systems: Hydrostatic test.

The cargo and process piping systems inside and outside a tank must pass, in the presence of a marine inspector—

(a) A hydrostatic test to at least 1.5 times the design pressure after installation on the vessel;

(b) If the systems or part of the systems are manufactured with fittings, a hydrostatic test to at least 1.5 times the design pressure before or after installation on the vessel, except joints welded on board must be tested after installation on the vessel; or

(c) If the water for the test under paragraphs (a) or (b) of this section cannot be removed and traces of the water cannot be tolerated during the service of the vessel, an alternate test that is specially approved by the Commandant (G-MMT).

§ 154.72 Cargo and process piping systems: Leak test.

After installation on the vessel and in the presence of a marine inspector, the cargo and proces piping systems must pass a leak test with air, halides, or another medium at a pressure specially approved by the Commandant (G-MMT).

§ 154.74 Cargo and process piping systems: Functional test.

Before or during the first loading operation and in the presence of a Coast Guard inspector, the cargo and process piping system, including valves, fittings, and associated equipment for loading and discharging cargo or vapor, must be tested to determine if they load and discharge cargo and vapor under operating conditions.

§ 154.76 Integral tank: Production weld test.

An integral tank must pass, in the presence of a marine inspector, the production weld test of a recognized classification society.

§ 154.78 Membrane tank: Production weld test.

A membrane tank must pass, in the presence of a marine inspector, a production weld test that is specially approved by the Commandant (G-MMT).

§ 154.80 Semi-membrane tank; independent tank type A or B: Production weld test.

If a semi-membrane tank or an independent tank type A or B has a service temperature colder than -18° C (0° F), each 50 m (164 ft.) of butt welded joints in the tank must pass, in the presence of a marine inspector, the following production weld tests in the position that the joint is welded:

(a) A bend test under § 57.06-4 of this chapter.

(b) A charpy V-notch test, under § 57.06-5 of this chapter, using 3 specimens with the notch alternately in the center of the weld and the most critical loaction in the heat affected zone.[2]

(c) If a butt welded joint in the tank does not pas the test under paragraph (b) of this section, it must be retested following the procedures under § 54.05-5 (c) of this chapter.

§ 154.82 Independent tank type C and process pressure vessel: Production weld test.

An independent tank type C and process pressure vessel must pass, in the presence of a marine inspector, the production weld tests under Subpart 57.06 of this chapter.

§ 154.84 Secondary barrier: Production weld test.

If a secondary barrier has a service temperature lower than −18° C (0° F) each 50 m (164 ft.) of butt welded joints in the secondary barrier must pass, in the presence of a marine inspector, a production weld test in the position that the joint is welded under—

(a) Section 154.76;
(b) Section 154.78; or
(c) Section 154.80.

§ 154.90 Integral tank: Weld inspection standards.

An integral tank must meet the weld inspection standards of a recognized classification society.

§ 154.92 Membrane tank: Weld inspection standards.

A membrane tank must meet the weld standards specially approved under § 154.425.

§ 154.94 Independent tank type A; semi-membrance tank: Weld inspection standards for shell plating.

(a) For independent tanks type A and semi-membrane tanks with design temperatures of −20° C (−4° F) or colder, each full penetration butt weld of a tank's shell plating must pass a 100 percent radiographic test.

(b) For independent tanks type A and semi-membrane tanks with design temperatures warmer than −20° C (−4° F), each full penetration butt weld intersection of a tank's shell plating must pass a radiographic test and 10 percent of the remaining full penetration butt welds must pass a radiographic test.

§ 154.96 Independent tank type B; Weld inspection standards for shell plating.

For independent tanks type B each full penetration butt weld of a tank's shell plating must pass a—

(a) 100 percent radiographic test; and

(b) 100 percent ultrasonic test under Appendix U of Division 1 of Section VIII, ASME Code, 1974 edition.

§ 154.98 Radiographic inspection standards for welds.

(a) As used in this section:

(1) "t" means the thickness of the thinner portion of the weld.

(2) "Slag inclusion" means a nonmetallic solid material entrapped in weld metal or between weld metal and base metal including oxide and dirt.

(3) "*l*" means the length of the longest imperfection in a group of imperfections.

(b) A full penetration butt weld does not pass the test under § 154.94 or § 154.96 for the following types of imperfections:

(1) Any crack or zone of incomplete fusion or penetration.

(2) Any elongated slag inclusion that is longer than—

(i) 6.4 mm (¼ in.) for t less than 19.2 mm (¾ in.);

(ii) 8.5 mm (⅓ in.) for t of 19.2 mm (¾ in.) to 57.2 mm (2¼ in.); or

(iii) 19.2 mm (¾ in.) for t more than 57.2 mm (2¼ in.)

(3) Any group of aligned slag inclusions that together are longer than t in a length of 12 t, except when the distance between the successive imperfections exceeds-6*l*.

(4) Any stainless steel wire bristle that is longer than 9.5 mm (⅜ in.) or wider than 1.6 mm (1/16 in.).

(5) Tungsten inclusions in excess of 20 percent of t or 3.2 mm (⅛ in.), whichever is less in any dimension.

(6) Copper inclusions more than 3.2 mm (⅛ in.) in any dimension.

(7) Any dispersed cloud or diffused alloying of metals of higher density than aluminum more than 3.2 mm (⅛ in.) in any dimension.

(8) Metallic and non-metallic inclusions that are closer to each other than four times the length of the longest inclusion.

(9) The cumulative length of metallic inclusions, non-metallic inclusions, or both, that occur within a 3 t or 152.4 mm (6 in.) length of weld, whichever is less, and are greater than 38.1 mm (1½ in.) for nonaligned inclusions and 25.4 mm (1 in.) for aligned inclusions.

(10) The number of metallic inclusions, non-metallic inclusions, or both that occurs within 3 t or 152.4 mm (6 in.) length of weld, whichever is less, is more than seven for nonaligned inclusions and five for aligned inclusions.

(11) Any metallic inclusion lying on or penetrating the surface of the weld or heat affected zone of the weld.

(12) Porosity that exceeds the limits allowed in Appendix IV of Division 1 of Section VIII, of the ASME Code, 1974 edition.

§ 154.100 Semi-membrane tank: independent tank type A or B: Additional weld inspection standards.

The structure of the following tanks, except shell plating, must pass, in the presence of a marine inspector, a magnetic particle or dye penetrant method that is specially approved by the Commandant (G-MMT):

(a) An independent tank type A or a semi-membrane tank designed under § 154.435 as an independent tank type A.

(b) An independent tank type B or a semi-membrane tank designed under § 154.435 as an independent tank type B.

§ 154.102 Independent tank type C: Weld inspection standards.

An independent tank type C must, in the presence of a marine inspector—

[2] The most critical location in the heat affected zone of the weld is based on procedure qualification results except austenitic stainless steel has notches only in the center of the weld.

(a) Meet the requirements under §§ 54.10–1 and 54.10–3 of this chapter;
(b) Pass a 100 percent radiographic test of each full penetration butt weld of the tank's shell plating;
(c) Pass a 10 percent ultrasonic test under Appendix U of Division 1 of Section VIII, ASME Code, 1974 edition, 10 percent magnetic particle, or 10 percent dye penetrant test of all tank welds; and
(d) Pass a 100 percent ultrasonic test under Appendix U of Division 1 of Section VIII, ASME Code, 1974 edition, 100 percent magnetic particle test, or 100 percent dye penetrant test of each weld on reinforcement rings around holes and nozzles.

§ 154.104 Process pressure vessels: Weld inspection standards.

A process pressure vessel must, in the presence of a marine inspector—
(a) Meet the requirements under §§ 54.10–1 and 54.10–3 of this chapter;
(b) Pass a radiographic test of each full penetration butt weld intersection of the tank's shell plating;
(c) Pass a 10 percent radiographic test of each of the remaining full penetration butt welds; and
(d) Pass a 100 percent ultransonic test under Appendix U of Division 1 of Section VIII, ASME Code, 1974 edition, 100 percent magnetic particle test, or 100 percent dye penetrant test of each weld on reinforcement rings around holes and nozzles.

§ 154.106 Cargo and process piping systems inspection standards.

The cargo and process piping systems must meet the inspection requirements under Subpart 56.95 of this chapter.

§ 154.108 Secondary barrier: Inspection standards.

(a) A secondary barrier must pass tests that are specially approved by the Commandant (G–MMT).
(b) If the outer hull of a vessel is part of the secondary barrier, the sheer strake butt welds and the intersections of all but and seam welds in the side of the hull must pass a 100 percent radiographic test.

§ 154.110 First loading and discharging records.

The master shall keep records of the operation of the following during the first loading and discharging of the cargo:
(a) Tanks.
(b) Cargo piping.
(c) Process pressure vessels.
(d) Cargo pumps.
(e) Cargo compressor.
(f) Hull structure heating system.
(g) Pressure and temperature control devices.

§ 154.120 Hull heating systems inspection.

During the first loading and discharge of the cargo, the master shall inspect the hull structure heating system and ensure that it meets the heat output and distribution requirements under §§ 154.174, 154.176, and 154.178.

§ 154.122 Hull cold spot inspection.

(a) A procedure for repairing the cargo containment system to correct hull cold spots must be specially approved by the Commandant (G–MMT).
(b) During the first loading and discharge of the cargo the master shall inspect the hull and ensure that each cold spot is corrected under the procedure required under paragraph (a) of this section.

CERTIFICATION OF INSPECTION RENEWAL REQUIREMENTS

§ 154.130 Purpose.

Sections 154.132 through 154.142 prescribe the requirements for the periodic inspections and tests of the cargo containment system, process pressure vessels cargo and process piping, and hull heating and cold spots for renewal of a liquefied gas vessel's certificate of inspection.

§ 154.132 First 12 month inspection.

During the twelfth month after the month an original certificate of inspection is issued for a liquefied gas vessel under § 31.05–1 of this chapter, the vessel must pass the following inspections in the presence of a marine inspector to retain the original certificate:
(a) An external visual inspection for defects of the following parts of a cargo containment system:
(1) Tank.
(2) Tank support structure, including foundations, chocks, islands, and saddles.
(3) Positioning structure, including keys and keyways.
(4) Equipment hatches.
(5) Personnel access, including hatches.
(6) Penetrations, including piping and electrical cable.
(7) Secondary barrier, except a test under § 154.62 may be substituted if the secondary barrier is inaccessible to the inspector.
(8) Adjacent hull structure.
(9) Insulation, without removing fixed insulation, tank structure, and hull structure.
(b) An internal visual inspection of at least one of each type of tank described in this part, including the cargo equipment and the cargo equipment mountings, for—
(1) Corrosion;
(2) Cracking of base metal;
(3) Weld defects; and
(4) Plating distortion, including buckling.
(c) An inspection of at least one of each type of tank relief valve that includes—
(1) Having defective parts repaired;
(2) The pressure setting test; and
(3) Sealing the pressure setting adjustment.
(d) An inspection for tank tightness by confirming the accuracy of—
(1) The gas detection system;
(2) Temperature measuring devices;
(3) Flow meters; and
(4) Log book entries for tanks.
(e) An external visual inspection of each interbarrier space venting system for—
(1) Corrosion;
(2) Piping distortion;
(3) Leaking piping joints;
(4) Loose piping supports; and
(5) Broken relief valve seals.
(f) An external inspection of each tank venting system for—
(1) Corrosion;
(2) Piping distortion;
(3) Leaking piping joints;
(4) Loose piping supports; and
(5) Broken relief valve seals.
(g) An inspection of the gas leak detection system by—
(1) Confirming the accuracy of the gas leak detection equipment, including indicators and alarms;
(2) A visual inspection of the gas leak detection piping for corrosion and piping distortion; and
(3) Confirming the log book entries for gas detection.
(h) An inspection of the inert gas system by a visual inspection of the—
(1) Inert gas equipment, including generator, storage tanks, indicators, and alarms to determine if they operate; and
(2) Inert gas piping for corrosion and piping distortion.
(i) An external visual inspection of cargo handling piping and machinery, including cargo and process piping, cargo heat exchanges, vaporizers, and compressors, for—
(1) Corrosion;
(2) Piping distortion;
(3) Leaking piping joints; and
(4) Loose piping supports.
(j) An external visual inspection of the hull heating piping coils for—
(1) Corrosion;
(2) Piping distortion;
(3) Leaking piping joints; and
(4) Loose piping supports.

§ 154.134 Each 12 month inspection.

Once during each 12 month period after the inspection under § 154.132 a vessel issued an endorsement under § 154.4 must pass, in the presence of a marine inspector, the inspections under §§ 154.132 (d) through (j) to retain the endorsement.

§ 154.136 Special 48 month and 96 month inspections.

During the 48th month and the 96th month after a vessel is issued an endorsement under § 154.4, the vessel must pass, in the presence of a marine inspector, the inspections under § 154.134 and the following inspections to retain the endorsement:
(a) An internal visual inspection of each tank, except independent tanks type C and process pressure vessels, including inspection of the cargo equipment, and cargo equipment mountings, for—
(1) Corrosion;
(2) Cracking of base metal;
(3) Weld defects; and
(4) Plating distortion, including buckling.
(b) Integral tanks and independent tanks types A and B must pass a hydrostatic or hydropneumatic test at a pressure at the top of the tank that is at least equal to the MARVS.
(c) Membrane and semi-membrane tanks must pass a hydrostatic, hydro-

(c) A heat load calculation must show that the heating system meets paragraph (b)(2) of this section.

§ 154.176 Longitudinal contiguous hull structure.

(a) The longitudinal contiguous hull structure of a vessel having tanks without secondary barriers must meet the standards of a recognized classification society.

(b) The longitudinal contiguous hull structure of a vessel having tanks with secondary barriers must have a minimum design temperature that is—

(1) Colder than the calculated temperature of this hull structure assuming the—

(i) Temperature of the secondary barrier is the temperature of the cargo carried; and

(ii) For any waters in the world except Alaskan waters, ambient cold condition of—

(A) Five knots air at −18° C (0° F); and

(B) Still sea water at 0° C (32° F); or

(iii) For Alaskan waters the ambient cold condition of—

(A) Five knots air at 29° C (−20° F); and

(B) Still sea water at 2° C (28° F); or

(2) Maintained by the heating system under § 154.178, if, without heat, the contiguous hull structure has at least a minimum design temperature that is colder than the calculated temperature of the hull structure assuming the—

(i) Temperature of the secondary barrier is the temperature of the cargo carried; and

(ii) *Ambient cold conditions of still* air at 5° C (41° F) and still sea water at 0° C (32° F).

(c) A heat load calculation must show that the heating system meets pargraph (b)(2) of this section.

§ 154.178 Contiguous hull structure: Heating system.

The heating system for transverse and longitudinal contiguous hull structure is an essential auxiliary and must—

(a) Have the heating capacity to meet § 154.174 of § 154.176;

(b) Have stand-by heating to provide 100 percent of the required heat load and distribution determined under § 154.174 (c) and § 154.176(c); and

(c) Meet Parts 52, 53, and 54 of this chapter.

§ 154.180 Contiguous hull structure: Welding procedure.

Welding procedure tests for contiguous hull structure with a design temperature colder than −18° C (0° F) must meet § 54.05–15 and Part 57.03 of this chapter.

§ 154.182 Contiguous hull structure: Production weld test.

If the contiguous hull structure has a design temperature colder than −34° C (−30° F), each 50 m (164 ft.) of full penetration butt welded joints in the contiguous hull structure must pass, in the presence of a Coast Guard inspector, the following production weld tests in the position that the joint is welded:

(a) A bend test under § 57.06–4 of this chapter.

(b) A charpy V-notch test under § 57.06–5 of this chapter from 3 specimens with the notch alternately located in the center of the weld and the most critical location in the heat affected zone.[3]

(c) If the contiguous hull structure does not pass the test under paragraph (b) of this section, the retest procedures under § 54.05–5(c) must be used.

§ 154.188 Membrane tank: Inner hull steel.

For a vessel with membrane tanks, the inner hull plating thickness must meet the deep tank requirements of a recognized classification society.

§ 154.195 Aluminum tank: Steel enclosure.

(a) An aluminum tank and its dome must be enclosed by the vessel's hull structure or a separate steel cover.

(b) The steel cover for the aluminum tank must meet the steel structural standards of a recognized classification society.

(c) The steel cover for the aluminum tank dome must be—

(1) At least 3 mm (⅛ in.) thick;

(2) Separated from the tank dome, except at the support points; and

(3) Thermally isolated from the dome.

SHIP SURVIVAL CAPABILITY AND CARGO TANK LOCATION

§ 154.200 Stability requirements: General.

Each vessel must be stable for the full range of drafts taking into account any empty or partially filled tanks and the weight and volume of the cargoes carried.

§ 154.205 Intact stability requirements.

(a) Each vessel must meet Part 93 of this chapter.

(b) During loading and unloading the vessel must have at least 50 mm (2 in.) of positive metacentric height.

§ 154.210 Damage stability requirement.

Each vessel must be shown by design calculations to meet the survival presumptions in § 154.230 assuming the damage for the cargo it carries in the hull type specified in § 154.215.

154.215 Hull type calculation.

(a) Where Table 4 requires a type I G hull, design calculations must show that the vessel can survive damage at any location.

(b) Where Table 4 requires a type II G hull, design calculations must show that a vessel—

(1) Longer than 150 m (492.15 ft.) in length can survive damage at any location; and

(2) 150 m (492.15 ft.) long or shorter can survive damage at any location except the transverse bulkheads bounding an aft machinery space.

(c) If a vessel has independent tanks Type C with a MARVS of 7 kp/cm² (100 psig) and Table 4 allows a type II PG hull the design calculations must show that a 150 m (492.15 ft.) long or shorter vessel can survive damage at any location, except on transverse bulkheads spaced farther apart than the longitudinal extent of damage specified in § 154.220(a)(1).

(d) Where Table 4 requires a type III G hull, design calculations must show that a vessel—

(1) 125 m (410.13 ft.) or longer can survive damage at any location except on transverse bulkheads spaced farther apart than the longitudinal extent of damage specified in § 154.230(a)(1); and

(2) Shorter than 125 m (410.13 ft.) can survive damage at any location, except on transverse bulkheads spaced farther apart than the longitudinal extent of damage specified in § 154.220(a)(1) and except in the main machinery space.

(e) For the purposes of paragraphs (c) and (d) of this section, damage must be assumed to transverse bulkheads spaced closer than the longitudinal extent of damage specified in § 154.220(a)(1), and a main transverse bulkhead or a transverse bulkhead bounding side tanks or double bottom tanks must be assumed damaged if there is a step or a recess in a transverse bulkhead that is longer than 3 m (10 ft.) located within *the extent of penetration of assumed* damage. The step formed by the after peak bulkhead and after peak tank top is not a step for the purpose of this regulation.

§ 154.220 Damage calculations.

(a) For the purpose of § 154.210, design calculations must assume both side and bottom damage, applied separately.

(b) Damage must consist of the most disabling penetration up to and including penetrations having the following dimensions:

(1) *Side penetration.*

(i) Longitudinal extent: $1/3\ L^{2/3}$ or 14.5 m ($0.495\ L^{2/3}$ or 47.6 ft.), whichever is shorter.

(ii) Transverse extent (inboard from the ship's side at right angles to the centerline at the level of the summer load line assigned under subchap. E): B/5 or 11.5 m (37.7 ft.), whichever is shorter.

(iii) Vertical extent: from the base line upward without limits:

(2) *Bottom penetration.*

At the forward end but excluding any damage aft of a point 0.3 L aft of forward perpendicular:

(i) Longitudinal: $⅓\ L^{2/3}$ or 14.5 m ($.495\ L^{2/3}$ or 47.6 ft.), whichever is shorter.

(ii) Transverse: B/6 or 10 m (32.8 ft.), whichever is shorter.

(iii) Vertical extent from the molded line of the shell at the centerline: B/15 or 2 m (6.6 ft.), whichever is shorter.

[3] The most critical location in the heat affected zone of the weld is based on procedure qualification results, except austenitic stainless steel has notches only in the center of the weld.

At any longitudinal position aft of a point 0.3 L aft of the forward perpendicular:
(i) L/10 or 5 m (16.4 ft.), whichever is shorter.
(ii) B/6 or 5 m (16.4 ft.), whichever is shorter.
(iii) B/15 or 3 m (6.6 ft.), whichever is shorter.

(c) When the damage assumption excludes a transverse bulkhead bounding a machinery space, the machinery space must be assumed to be damaged as a case separate from the side and bottom peneration.

§ 154.225 Permeability of spaces and free surface effect.

(a) The free surface effect must be calculated at an angle of heel of 5° for each individual space or the effect of free liquid in a tank must be calculated by assessing the shift of liquids by moment of transference caluculations.

(b) In calculating the effect of free surfaces of consumable liquids, it must be assumed that, for each type of liquid, at least one transverse pair of wing tanks or a single center line tank has a free surface, and the tank or combination of tanks must be selected where the effect of free surfaces is the greatest.

(c) Calculations in which a machinery space is treated as a floodable space must be based on an assumed machinery space permeability of 0.85, unless the use of an asumed permeability of less than 0.85 is justified in detail.

(d) The assumed permeability of a floodable space other than a machinery space must be as follows:

(1) Storerooms, 0.60; (2) Accommodation spaces, 0.95; (3) void, 0.95; (4) consumable liquid tanks, 0.95 or 0, whichever results in the more disabling; (5) other liquid tanks, 0.95 or 0.[4]

Wherever damage penetrates a cargo tank it must be assumed that the cargo is completely lost from the compartment and replaced by salt water up to the level of the final plane of equilibrium.

§ 154.230 Damage survival.

A vessel is presumed to survive assumed damage if it meets the following conditions in the final stage of flooding:

(a) *Heel angle.* The maximum angle of heel must not exceed 30°.

(b) *Final waterline.* The waterline, taking into account sinkage, heel and trim, must be below the lower edge of openings such as air pipes and openings closed by weathertight doors or hatch covers, except openings closed by means of watertight manhole covers and watertight flush scuttles, small watertight cargo tank hatch covers that maintain the high integrity of the deck, remotely operated watertight sliding doors, and side scuttles of the non-opening type.

(c) *Range of stability.* (1) The righting lever curve must be positive and have a minimum range of 20° beyond the angle of equilibrium.

(2) The maximum righting lever within the range specified in paragraph (c)(1) of this section must be at least 100 mm (3.9 in.).

(3) Each opening within the 20° range beyond the angle of equilibrium must be at least weathertight.

(d) *Local damage.* The maximum angle of heel must not exceed the greater of 30° or the angle at which restoration of propulsion, steering engine power and use of the ballast system is precluded for local damage, extending 760 mm (29.9 in.) normal to the hull shell, that affects a—

(1) Longitudinal bulkhead; and

(2) Transverse bulkhead on type IG and IIG vessels.

(e) *Equalization arrangements.* Equalization arrangements requiring mechanical aids such as valves or cross-flooding lines may not be considered for reducing the angle of heel. Spaces joined by ducts of large cross sectional area are treated as common spaces.

(f) *Progressive flooding.* If pipes, ducts, or tunnels are within the assumed extent of damage, arrangements must be made to prevent progressive flooding in a space that is not assumed to be flooded in the damaged stability calculations. If an intermediate stage of flooding is more critical than the final stage, calculations for the intermediate stage must be submitted for special approval by Commandant (G-MMT).

§ 154.235 Tank location.

(a) For type IG hulls, cargo tanks must be located inboard of—

(1) The transverse damage specified in § 154.220(b)(1)(ii);

(2) The verticle damage specified in § 154.220(b)(2)(iii); and

(3) 760 mm (30 inches) from the shell planting.

(b) For type IIG, IIPG, and IIIG hulls cargo tanks must be located inboard of—

(1) The vertical extent of damage specified in § 154.220(b)(2)(iii); and

(2) 760 mm (30 inches) from the shell plating.

(c) In vessels having membrane and semi-membrane tanks, the vertical and transverse extents of damage must be measured to the inner hull.

(d) For type IIG, IIPG, and IIIG hulls, tank suction wells may penetrate into the area of bottom damage specified in § 154.220(b)(2)(iii) if the penetration is the lesser of 25 percent of the double bottom height or 350 mm (13.8 in.).

SHIP ARRANGEMENTS

§ 154.300 Segregation of hold spaces from other spaces.

Hold spaces must be segregated from machinery and boiler spaces, accommodation, service and control spaces, chain lockers, potable, domestic and feed water tanks, store rooms and spaces immediately below or outboard of hold spaces by a—

(a) Cofferdam, fuel oil tank, or single gastight A-60 Class Division of all welded construction in a cargo containment system not requiring a secondary barrier;

(b) Cofferdam or fuel oil tank in a cargo containment system requiring a secondary barrier; or

(c) If there are no sources of ignition or fire hazards in the adjoining space, single gastight A-O Class Division of all welded construction.

§ 154.305 Segregation of hold spaces from the sea.

In vessels having cargo containment systems requiring a secondary barrier, hold spaces must be segregated from the sea by—

(a) A double bottom if the cargo tanks are approved for temperatures colder than −10° C (14° F); and

(b) Wing tanks if the cargo tanks are approved for temperatures colder than −55° C (−67° F).

§ 154.310 Cargo piping systems.

Cargo liquid or vapor piping must—

(a) Be separated from other piping systems, except where an interconnection to inert gas or purge piping is required by § 154.901(a);

(b) Not enter or pass through any accommodation, service, or control space;

(c) Except as allowed under § 154.703, not enter or pass through a machinery space other than a cargo pump or compressor room;

(d) Be in the cargo area above the open deck, except for bow and stern loading and emergency dumping;

(e) Connect into the cargo containment system above the open deck except—

(1) Pipes in a trunk traversing void spaces above a cargo containment system; and

(2) Pipes in cofferdams for draining, venting, or purging interbarrier and hold spaces; and

(f) Be inboard of the transverse tank location required by § 154.206, except for thwartship shore connection manifolds not subject to internal pressure at sea.

§ 154.315 Cargo pump and compressor rooms.

(a) Cargo pump rooms and cargo compressor rooms must be above the open deck and within the cargo area.

(b) Where pumps and compressors are driven by a prime mover in an adjacent gas safe space—

(1) The bulkhead or deck must be gastight; and

(2) The shafting passing through the bulkhead or deck must be sealed by a fixed oil reservoir gland seal or other positive pressure seal specially approved by the Commandant (G-MMT).

§ 154.320 Cargo control stations.

(a) Cargo control stations must be above the open deck.

(b) If a cargo control station is in accommodation, service, or control space or has access to such a space, the station must—

(1) Be a gas safe space;

(2) Have an access to the space that meets § 154.30 and

(3) Have indirect reading instrumentation, except for gas detectors.

(c) Cargo control stations, including a room or area, must contain all alarms, indicators, and remote controls associated with each tank that the station controls.

[4] The permeability of partially filled tanks must be consistent with actual density and amount of liquid carried.

§ 154.325 Accommodation, service, and control spaces.

(a) Accommodation, service, and control spaces must be outside the cargo area.

(b) If a hold space having a cargo containment system that requires a secondary barrier is separated from any accommodation, service, or control space by a cruciform joint, there must be a cofferdam on one side of the cruciform joint.

§ 154.330 Openings to accommodation, service, or control spaces.

(a) Entrances, forced or natural ventilation intakes and exhausts, and other openings, except as allowed in paragraph (c) of this section, must be—

(1) At least L/25 or 3 m (10 ft) from the athwartship bulkhead facing the cargo area, whichever is farther, except that the distance need not exceed 5 m (16.4 ft); and

(2) On a house athwartship bulkhead not facing the cargo area or on the outboard side of the house.

(b) Port lights located on the athwartship bulkhead of a house facing the cargo area, or the house sides within L/25 or 5 m (16.4 ft), whichever is less, must not open.

(c) Wheelhouse doors and windows that open may be within L/25 or 5 m (16.4 ft), whichever is less, of the athwartship bulkhead of a house facing the cargo area, if they have gaskets and dogs to make them watertight when tested with a fire hose at not less than 2.11 kp/cm² (30 psig).

(d) Port lights in the hull plating below the uppermost continuous deck and in the first tier of the superstructure must not open.

(e) Air intakes and openings into accommodation, service and control spaces must have—

(1) Gasketed metal covers; and

(2) On toxic cargo vessels, covers that can be closed from inside the space.

§ 154.340 Access to tanks and spaces in the cargo area.

In the cargo area—

(a) Each cargo tank must have a manhole from the open deck, the clear opening of which is at least 600 mm by 600 mm (23.6 in. by 23.6 in.);

(b) Each access to a hold space, void space, or other gas dangerous space must have a clear opening of at least 600 mm by 600 mm (23.6 in. by 23.6 in.);

(c) Each manhole through bulkheads, frames, or other vertical structural member must have a clear opening of at least 600 mm (23.6 in.) by 800 mm (31.5 in.) and be at most 600 mm (23.6 in.) from the deck or bottom plating unless there is a fixed ladder;

(d) Each access trunk must be at least 760 mm (30 in.) in diameter.

(e) The lower edge of each access from the open deck to gas safe spaces in the cargo area must be at least 2.4 mm (7.87 ft.) above the open deck or through an air lock that meets § 154.345;

(f) The inner hull must be accessible for inspection from at least one side without the removal of any fixed structure or fitting; and

(g) The hold space insulation must be accessible for inspection from at least one side from within the hold space while the tank is at the cargo temperature unless an inspection method from outside of the hold space is specially approved by the Commandant (G-MMT).

§ 154.345 Air locks.

(a) An air lock may be used for access from a gas dangerous zone on the open deck to a gas safe space in the cargo area.

(b) Each air lock must—

(1) Consist of two steel doors, at least 1.5 m (4.92 ft.) but not more than 2.5 m (8.20 ft.) apart each gasketed and dogged and watertight when tested with a fire hose at not less than 2.11 kp/cm² (30 psig);

(2) Have self-closing doors with no latches or other devices for holding them open;

(3) Have an audible and visual alarm on both sides actuated when the securing devices on both doors move from the fully closed position at any one time;

(4) Have mechanical ventilation in the space between the doors from a gas safe area;

(5) Have a pressure greater than that of the gas dangerous area on the open deck;

(6) Have the rate of air change in the space between the doors of at least 12 changes per hour;

(7) Have the space between the doors monitored for cargo vapor leaks under § 154.1350; and

(c) In addition to the requirements of paragraphs (a) and (b) of this section, no gas safe space on a liquefied flammable gas carrier may have an air lock unless the space—

(1) Is mechanically ventilated to make the pressure in the space greater than that in the air lock; and

(2) Has a means of automatically de-energizing all electrical equipment that is not explosion-proof in the space when the pressure in the space falls to or below the pressure in the air lock.

§ 154.350 Bilge and ballast systems in the cargo area.

(a) Hold, interbarrier, and insulation spaces must have a means of sounding the space or other means of detecting liquid leakage acceptable to the Commandant (G-MMT).

(b) Each hold and insulation space must have a bilge drainage system.

(c) Interbarrier spaces must have an educator or pump for removing liquid cargo and returning it to the cargo tanks or to an emergency dump.

(d) Spaces in the cargo containment portion of the vessel, except ballast spaces and gas safe spaces, must not connect to pumps in the main machinery space.

§ 154.355 Bow and stern loading piping.

(a) Bow and stern loading piping must—

(1) Meet § 154.310;

(2) Be installed in an area away from the accommodation, service, or control space on type I G hulls;

(3) Be clearly marked;

(4) Be segregated from the cargo piping by at least two shut off valves in the cargo area that has a means of locking to meet § 154.1370(a);

(5) Have a means for checking cargo vapor between the two valves required in paragraph (a)(3) of this section;

(6) Have fixed inert gas purging lines; and

(7) Have fixed vent lines for purging with inert gas to meet § 154.1870(b).

(b) Entrances, forced or natural ventilation intakes, exhaust, and other openings to accommodation, service, or control spaces that face the bow or stern loading area must meet §§ 154.330.

CARGO CONTAINMENT SYSTEMS

§ 154.401 Definitions.

As used §§ 154.440 and 154.447:

"σ_Y" means the minimum yield stress of the tank material, including weld metal, at room temperature.

"σB" means minimum tensile strength of the tank material, including weld metals at room temperature.

§ 154.405 P_o of a tank.

(a) The P_o of a tank must be equal to or greater than the MARVS.

(b) The P_o of a tank must be equal to or greater than the vapor pressure of the cargo at 45° C (113° F) if—

(1) The tank has no temperature control for the cargo; and

(2) The pressure of the cargo results from ambient temperature.

(c) The P_o of a tank may be less than the vapor pressure for harbor conditions if specially approved by the Commandant (G-MMT).

§ 154.406 Design loads for tanks and fixtures: General.

(a) It must be shown that a tank and its fixtures are designed for the following loads:

(1) Internal pressure head.

(2) External pressure load.

(3) Dynamic loads resulting from the motion of the vessel.

(4) Transient or stationary thermal loads if the cargo temperature is colder than −55° C (−67° F) or causes thermal stresses in tank support.

(5) Sloshing loads, if the tank is designed for partial loads.

(6) Loads resulting from vessel's deflection.

(7) Tank weight, cargo weight, and corresponding support reaction.

(8) Insulation weight.

(9) Loads of a tower and any other attachments to the tank.

(10) Vapor pressure loads in harbor conditions allowed under § 154.405.

(11) Gas pressurization for cargo transfer load.

(b) A tank must be designed for the most unfavorable static heel angle within a 0° to 30° range without exceeding the allowable stress of the material.

(c) A hydrostatic or hydropneumatic test design load must be specially approved by the Commandant (G-MMT).

§ 154.407 Tank internal pressure head.

(a) For the calculation required under § 154.406(a), the internal pressure head (h_{eq}), must be determined from the following formula:

$$h_{eq} = 10\,P_o + (h_{\beta d})\ \max$$

$h_{\beta d}$ (the value of internal pressure, in meters of fresh water, resulting from the combined effects of gravity and dynamical accelerations of a full tank) $= a_\beta Z$;
where

a_β = Dimensionless acceleration relative to the acceleration of gravity, resulting from gravitational and dynamical loads in the β direction (see figure 1);

Z_β = Largest liquid height (m) above the point where the pressure is to be determined in the β direction (see figure 2);

λ = Maximum specific weight of the cargo (t/m³) at the design temperature.

(b) The $h_{\beta d}$ max must be determined from the β max direction on the ellipse in Figure 1 which gives the maximum value.

(c) When the longitudinal acceleration is considered in addition to the vertical and tranverse acceleration, an ellipsoid must be used in the calculations instead of the ellipse contained in Figure 1.

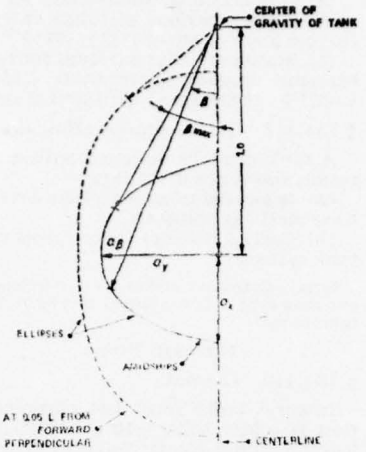
§ 154.408 Tank external pressure load.

For the calculation required under § 154.406(b), the external pressure load must be the difference between the minimum internal pressure (maximum vacuum), and the maximum external pressure to which any portion of the tank may be simultaneously subjected.

§ 154.409 Dynamic loads from vessel motion.

(a) For the calculation required under § 154.406(c), the dynamic loads must be determined from the long term distribution of vessel motions, including the effects of surge, sway, heave, roll, pitch, and yaw on irregular seas that the vessel may experience during 10⁸ wave encounters. The speed used for this calculation may be reduced from the ship service speed if specially approved by the Commandant (G-MMT) and if that reduced speed is used in the hull strength calculation under § 31.10-5(c) of this chapter.

(b) If the loads determined under paragraph (c), (d), or (e) of this section results in a design stress that is lower than the allowable stress of the material under §§ 154.610, 154.615, or 154.620, reduce the allowable stress to that stress determined in paragraph (c), (d), or (e) of this section.

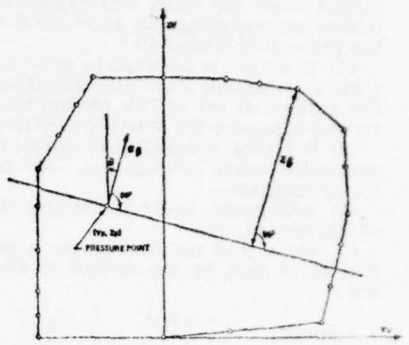


NOTE: RESULTING ACCELERATION (STATIC + DYNAMIC) = a_β IN ARBITRARY DIRECTION β.

a_y = TRANSVERSE COMPONENT OF ACCELERATION.

a_z = VERTICAL COMPONENT OF ACCELERATION.

Figure 1



NOTE: LARGEST LIQUID HEIGHT ABOVE THE POINT WHERE THE PRESSURE IS DETERMINED = Z_β

Figure 2

(c) If a tank is designed to avoid plastic deformation and buckling, then acceleration components of the dynamic loads are determined from one of the following methods:

(1) Method 1 is a detailed analysis of the vessels acceleration components.

2. Method 2 is an analysis by the following formulae:

(i) Vertical acceleration under § 154.409(f)(1):

$$a_z = \pm a_o \sqrt{1 + \left(5.3 - \frac{45}{L_o}\right)^2 \left(\frac{x}{L_o} + 0.05\right)^2 \left(\frac{0.6}{C_B}\right)^{3/2}}$$

(ii) Transverse acceleration under § 154.409(f)(2):

$$a_y = \pm a_o \sqrt{0.6 + 2.5 \left(\frac{x}{L_o} + 0.05\right)^2 + K \left(1 + 0.6\,K\,\frac{z}{B}\right)^2}$$

(iii) Longitudinal acceleration under § 154.409(f)(3):

$$a_x = \pm a_o \sqrt{0.06 + A^2 - 0.25A}$$

where:

$$A = \left(0.7 - \frac{L_o}{1200} + 5\,\frac{z}{L_o}\right)\left(\frac{0.6}{C_B}\right)$$

L_o = Length of the vessel between perpendiculars, in meters.

C_B = Block coefficient.

B = Greatest moulded breadth, in meters.

x = Longitudinal distance, in meters, from amidships to the center of gravity of the tank with contents (positive forward of amidships, negative aft of amidships).

z = Vertical distance in meters, from the vessel's waterline, to center of gravity of tank with contents (positive above and negative below the waterline).

$$a_o = 0.2\,\frac{V}{\sqrt{L_o}} + \frac{34 - \frac{600}{L_o}}{L_o}$$

V = Service speed in knots.

$K = 1.0$, or $\frac{13\,GM}{B}$, whichever is greater.

GM = Metacentric height in meters.

a_x = The maximum dimensionless acceleration in the x direction, acting separately for calculation purposes, and includes the component of the static weight in the longitudinal direction due to pitching.

a_y = Maximum dimensionless acceleration in the y direction, acting separately for calculation purposes, and includes the component of static weight in the transverse direction due to rolling.

a_z = Maximum dimensionless acceleration in the z direction, acting separately for calculation purposes, not including the static weight.

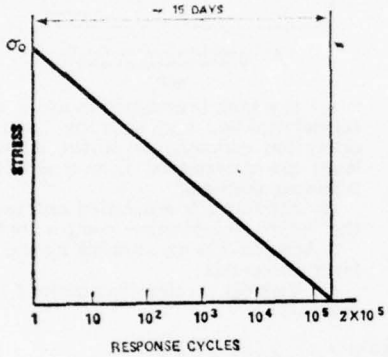
For Methods 1 and 2, acceleration components must be determined for the largest loads the vessel may experience during an operating life correspond to the probability level of 10^{-8}.

(d) If a tank is designed to avoid fatigue, the dynamic loads determined under paragraph (a) of this section must be used to develop the dynamic spectrum.

(e) If a tank is designed to avoid uncontrolled crack propogation, the dynamic loads are—

(1) determined under paragraph (a) of this section; and

(2) for a load distribution for a period of 15 days by the method in Figure 3.



NOTE: σ_0 = MOST PROBABLE MAXIMUM STRESS DURING THE LIFE OF THE VESSEL.

RESPONSE CYCLE SCALE IS LOGARITHMIC.

THE VALUE OF 2×10^5 IS GIVEN AS AN EXAMPLE OF ESTIMATE.

Figure 3

(f) When determining the accelerations for dynamic loads under paragraph (a) of this section, the accelerations acting in a tank must be estimated for the tank's center of gravity and include the following component accelerations:

(1) Vertical accelerations, meaning the motion acceleration of heave and pitch, and of any roll normal to the vessel base that has an effect on the component acceleration.

(2) Transverse acceleration, meaning the motion acceleration of sway, yaw and roll, and gravity component of roll.

(3) Longitudinal acceleration, meaning the motion acceleration of surge and pitch and gravity component of pitch.

§ 154.410 Tank sloshing loads.

(a) For the calculation required under § 154.406(a)(5), the determined sloshing loads resulting from the accelerations under § 154.409(f) must be specially approved by the Commandant (G-MMT).

(b) If the sloshing loads affect the tank scantlings, an analysis of the effects of the sloshing loads in addition to the calculation under paragraph (a) of this section must be specially approved by the Commandant (G-MMT).

§ 154.411 Tank thermal loads.

For the calculations required under § 154.406(d), the following determined loads must be specially approved by the Commandant (G-MMT):

(a) Transient thermal loads for the cooling down periods of tanks carrying cargoes lower than −55° C (−67° F).

(b) Stationary thermal loads for tanks carrying cargoes lower than −55° C (−67° F) that cause high thermal stress.

§ 154.412 Tank corrosion allowance.

A tank must be designed with a corrosion allowance if the tank—

(a) Is located in a space that does not have inert gas or dry air; or

(b) Carries a cargo that corrodes the tank material.

NOTE.—Corrosion allowance for independent tank type C is contained in § 54.01-35 of this chapter.

INTEGRAL TANKS

§ 154.418 General.

Integral tanks must not carry cargo that is colder than −10° C (14° F), unless the tank is specially approved by the Commandant (G-MMT).

§ 154.419 Design vapor pressure.

The P_o of an integral tank must not exceed 0.25 kp/cm² (4 psig) except it may be as high as 0.7 kp/cm² (10 psig) if specially approved by the Commandant (G-MMT).

§ 154.420 Tank scantlings.

(a) The scantlings of an integral tank must meet the deep tank scantling standard of a recognized classification society.

(b) The scantlings of an integral tank must be designed and shown by calculation to withstand the internal pressure determined under § 154.407.

§ 154.421 Allowable stress.

The allowable stress for integral tank scantlings must meet a recognized classification society's allowable stress for the vessel's hull.

MEMBRANE TANKS

§ 154.425 General.

The design of the hull scantlings, the membrane tank and secondary barrier, including welds, and the supporting insulation must be specially approved by the Commandant (G-MMT).

§ 154.426 Design vapor pressure.

The P_o of a membrane tank must not exceed 0.25 kp/cm² (4 psig), except it may be as high as 0.7 kp/cm² (10 psig), if specially approved by the Commandant (G-MMT).

§ 154.427 Tank scantlings.

The scantlings of a membrane tank must have a membrane and supporting insulation that is designed for—

(a) Any static and dynamic loads with respect to plastic deformation and fatigue;

(b) Combined strains from static, dynamic, and thermal loads;

(c) Preventing collapse of the membrane from—

(1) Over-pressure in the interbarrier space;

(2) Vacuum in the cargo tank;

(3) Sloshing in a partially filled tank; and

(4) Hull vibrations; and

(d) The deflections of the vessel's hull.

§ 154.428 Allowable stress.

The membrane tank scantlings and the supporting insulation must have allowable stresses that are specially approved by the Commandant (G-MMT).

§ 154.429 Calculations.

For a membrane tank, the tank design load calculations must include the following:

(a) Plastic deformation and fatigue life resulting from static and dynamic loads in the membrane and the supporting insulation.

(b) The response of the membrane and its supporting insulation to vessel motion and acceleration under the worse weather conditions. Calculations from a similar vessel may be submitted.

(c) The combined strains from static, dynamic, and thermal loads.

§ 154.430 Material test.

The analyzed data of a material test must show that the membrane and the membrane supporting insulation are made of materials that withstand the combined strains calculated under § 154.429(c).

§ 154.431 Model test.

The analyzed data of a model test must show that the primary and secondary barrier of a membrane tank, including the corners and joints, withstand the combined strains from static, dynamic, and thermal loads calculated under § 154.429(c).

§ 154.432 Expansion and contraction.

The support system of a membrane tank must allow for thermal and physical expansion and contraction of the tank.

SEMI-MEMBRANE TANKS

§ 154.435 General.

(a) The design of the semi-membrane tank, the supporting insulation for the tank, and the supporting hull structure for the tank must be specially approved by the Commandant (G-MMT).

(b) A semi-membrane tank must be designed to meet the requirements under—

(1) Section 154.425 through § 154.432;

(2) Section 154.437 through § 154.441; or

(3) Section 154.444 through § 154.449.

§ 154.436 Design vapor pressure.

The P_o of a semi-membrane tank must not exceed 0.25 kp/cm² (4 psig), except it may be as high as 0.7 kp/cm² (10 psig), if specially approved by the Commandant (G-MMT).

INDEPENDENT TANK TYPE A

§ 154.437 General.

The tank scantlings of an independent tank type A must meet the standard of a recognized classification society.

§ 154.438 Design vapor pressure.

(a) If the surfaces of an independent tank type A are mostly flat surfaces, the P_o must not exceed 0.7 kp/cm² (10 psig).

(b) If the surfaces of an independent type A are formed by bodies of revolution, the design calculation of the P_o must be specially approved by the Commandant (G-MMT).

§ 154.439 Tank scantlings.

(a) The scantlings of an independent tank type A must meet the deep tank standard of a recognized classification society.

(b) The scantlings of an independent tank type A must—

(1) Withstand the internal pressure determined under § 154.407;

(2) Withstand loads from tank supports calculated under §§ 154.470 and 154.471; and

(3) Have a corrosion allowance that meets § 154.412.

§ 154.440 Allowable stress.

(a) The allowable stresses for an independent tank type A are—

(1) For tank web frames, stringers, or girders of carbon maganese steel or aluminum alloys must meet $\sigma_B/2.66$ or, $\sigma_Y/1.33$, whichever is smaller; and

(2) For other materials, specially approved by the Commandant (G-MMT).

(b) A larger allowable stress than required in paragraph (a)(1) of this section may be specially approved by the Commandant (G-MMT) if the aquivalent stress (σ_e) is calculated from the formula in Appendix A to this part.

(c) Tank plating must meet the requirements of a recognized classification society for deep tanks having an internal pressure head that meets § 154.439 (b)(1).

INDEPENDENT TANK TYPE B

§ 154.444 General.

An independent tank type B must be designed—

(a) For the effect of static and dynamic loads on—

(1) Plastic deformation; (2) Fatigue life; (3) Buckling; and (4) Crack propagation; and

(b) From the results of the calculations under § 154.448.

§ 154.445 Design vapor pressure.

If the surfaces of an independent tank type B are mostly flat surfaces, the P_o must not exceed 0.7 kp/cm² (10 psig).

§ 154.446 Tank scantlings.

The tank scantlings of an independent tank type B must meet the calculations under § 154.448.

§ 154.447 Allowable stress.

(a) An independent tank type B designed from bodies of revolution must have allowable stresses[6] determined by the following formulae:

$$\sigma_m \leq f$$
$$\sigma_L \leq 1.5f$$
$$\sigma_b \leq 1.5F$$
$$\sigma_L + \sigma_b \leq 1.5F$$
$$\sigma_m + \sigma_b \leq 1.5F$$

where:

σ_m = Equivalent primary general membrane stress[6]
σ_L = Equivalent primary local membrane stress[6]
σ_b = Equivalent primary bending stress[6]

f = The lesser of $\frac{\sigma_u}{A}$ or $\frac{\sigma_y}{B}$

F = The lesser of $\frac{\sigma_B}{C}$ or $\frac{\sigma_y}{D}$

A, B, C, and D = Stress factors in table 2.

[5] See app. B for stress analyses definition.
[6] See app. A for equivalent stress.

TABLE 2.—*Values for stress factors*

Stress factors	Nickel steel and carbon manganese steel values	Austenitic steel values	Aluminum alloy values
A	0.4	0.4	0.4
B	[illegible]	1.6	1.5
C	.5	.3	.3
D	1.5	1.5	1.5

(b) An independent tank type B designed from plane surfaces must have allowable stresses specially approved by the Commandant (G-MMT).

§ 154.448 Calculations.

The following calculations for an independent tank type B must be specially approved by the Commandant (G-MMT):

(a) *Plastic deformation, fatigue life,* buckling, and crack propogation resulting from static and dynamic loads on the tank and its support.

(b) A three-dimensional analysis of the stress exerted on the tank, its support, and its keys by the hull.

(c) The response of the tank and its support to the vessel's motion and acceleration in irregular waves or calculations from a similar vessel.

(d) A tank buckling analysis considering the maximum construction tolerance.

(e) A finite element analysis using the loads determined under § 154.406.

(f) A fracture mechanics analysis using the loads determined under § 154.406.

(g) The cumulative effects of the fatigue load from the following formula:

$$\sum \frac{n_i}{N_i} + \frac{10^3}{N_j} \leq C_w$$

where:

n_i = The number of stress cycles at each stress level during the life of the vessel;
N_i = The number of cycles to failure for corresponding stress levels from the Wohler (S-N) curve;
N_j = The number of cycles to failure from the fatigue load by loading and unloading the tank; and
C_w = 0.5 or less.

§ 154.449 Model test.

The following analyzed data of a model test of structural elements for independent tank type B must be submitted to the Commandant (G-MMT) for special approval:

(a) Stress concentration factors.

(b) Fatigue life.

INDEPENDENT TANK TYPE C AND PROCESS PRESSURE VESSELS

§ 154.450 General.

Independent tanks type C and process pressure vessels must be designed to meet the requirements under Part 54 of this chapter, except § 54.01-40(b) and

(a) The calculation under § 54.01-18 (b)(1) must also include th design loads determined under § 154.406;

(b) The calculated tank plating thickness, including any corrosion allowance, must be the minimum thickness without a negative plate tolerance; and

(c) The minimum tank plating thickness must not be less than—

(1) 5 mm (3/16 in.) for carbon-manganese steel and nickel steel:

(2) 3 mm (1/8 in.) for austenitic steels, or

(3) 7 mm (9/32 in.) for aluminum alloys.

§ 154.451 Design vapor pressure.

The P_o of an independent tank type C must be calculated by the following formula:

$$P_o = 2 + AC(\rho)^{1/2} (kp/cm^2)$$

where:

$$A = 0.0185 \left(\frac{\sigma m}{\Delta \sigma_A}\right)^2$$

σ_m = Design primary stress;

$\Delta\sigma_A$ = (Allowable dynamic membrane stress for double amplitude at probability level $Q = 10^{-8}$) 5.5 kp/mm² (7160 psi) for ferritic and martensitic steels and 2.5 kp/mm² (3580 psi) for 5083-0 aluminum.

C = A characteristic tank dimension that is the greater of h when h is the height of the tank or the dimension in vessel's vertical direction, in meters; 0.75b when b is the width of the tank or the dimension in vessel's transverse direction, in meters; or 0.45l when l is the length of the tank or the dimension in vessel's longitudinal direction, in meters;

ρ = The specific gravity of cargo.

§ 154.452 External pressure.

The design external pressure for an independent tank type C must be calculated by the following formula:

$$P_e = P_1 + P_2 + P_3 + P_4 \ (kp/cm^2)$$

where:

P_1 = the vacuum relief valve setting for tanks with a vacuum relief valve, or 0.25kp/cm² for tanks without a vacuum relief valve.

P_2 = 0, or the pressure relief valve setting for an enclosed space containing any portion of a pressure vessel.

P_3 = total compressive load in the tank shell from the weight of the tank, including corrosion allowance, weight of insulation, weight of dome, weight of tower and piping, the effect of the partially filled tank, the effect of acceleration and hull deflection, and the local effect of external and internal pressure.

P_4 = 0, or the external pressure from the head of water from any portion of the pressure vessel on exposed decks.

§ 154.453 Failure to meet independent tank type C standards.

If the Commandant (G-MMT) determines during plan review, that a tank designed as an independent tank type C fails to meet the standards under §§ 154.450, 154.451, and 154.452 and can not be redesigned to meet those standards, the tank may be redesigned as an independent tank type A or B.

SECONDARY BARRIER

§ 154.459 General.

(a) Each tank must have a secondary barrier that meets Table 3.

TABLE 3.—*Secondary barriers for tanks*

Tank type	Cargo temperature at atmospheric pressure		
	−10°C (14°f) and warmer	Colder than −10°C (14°F) to −55°C (−67°F)	Colder than −55°C (−67°F)
Integral	No Secondary barrier required.	Tank type not usually allowed.[1]	Tan type not allowed.
Membrane	do	Complete secondary barrier [1]	Complete secondary barrier.[2]
Semimembrane	do	do [1]	Do.[2]
Independent:			
Type A	do	do [1]	Do.[2]
Type B	do	Partial secondary barrier [1]	Partial secondary barrier.[2]
Type C	do	No secondary barrier required	No secondary barrier required.

[1] The hull may be used as a secondary barrier.
[2] A separate secondary barrier is required.

(b) If the Commandant (G-MNT) specially approves an integral tank for cargoes with a temperature at atmospheric pressures lower than -10° C (14° F), the tank must have a complete secondary barrier that meets § 154.460.

(c) If the Commandant (G-MNT) specially approves a semi-membrane tank under the requirements of an independent tank type B, the semi-membrane tank may have a partial secondary barrier specially approved by the Commandant (G-NMT).

(d) If Table 3 allows the hull to be a secondary barrier, the vessel's hull must—

(1) Meet § 154.600; and

(2) Be designed for the stresses resulting from cargo temperature.

(e) A tank type that is not included in Table 3 must have a secondary barrier that is specially approved by the Commandant (G-NMT).

§ 154.460 Design criteria.

At static angles of heel up through 30°, a secondary barrier must—

(a) Hold any leakage of liquid cargo from the tank for at least 15 days under the loading requirements in § 154.409(e);

(b) If the primary barrier fails, prevent the vessel's structure temperature from falling below the minimum allowable service temperature of the steel; and

(c) Prevent the tank failure from causing a failure in the secondary barrier.

INSULATION

§ 154.465 General.

If the cargo that a vessel carries is below -10° C (14° F), the tank insulation must prevent the temperature of the vessel's hull from cooling below the minimum design temperature allowed under § 154.172.

§ 154.466 Design criteria.

(a) The insulation for a tank without a secondary barrier must be designed for the tank at the temperature of the cargo carried and for a vessel operating in—

(1) Any waters in the world except Alaskan waters for the ambient cold condition of—

(i) Five knots air at -18° C (0° F); and

(ii) Still sea water at 0° C (32° F); or

(2) Alaskan waters for the ambient cold condition of—

(i) Five knots air at 29° C (-20° F); and

(ii) Still sea water at 2° C (28° F).

(b) The insulation for a tank with a secondary barrier must be designed for the secondary barrier at the temperature of the cargo carried and the ambient cold conditions listed under paragraph (a)(1) or paragraph (a)(2) of this section.

(c) The insulation material must be designed for any loads transmitted from adjacent hull structure.

(d) Insulation for tank and piping must meet § 38.05-20 of this chapter.

(e) Powder or granulated insulation must—

(1) Not compact from vibrations of the vessel;

(2) Maintain the thermal conductivity specially approved under § 154.467; and

(3) Not exert a static pressure greater than the external design pressure of the tank under § 154.408.

§ 154.467 Submission of insulation information.

(a) The following insulation information must be submitted to the Commandant (G-MMT):

(1) Compatibility with the cargo.

(2) Solubility in the cargo.

(3) Absorption of the cargo.

(4) Shrinkage.

(5) Aging.

(6) Closed cell content.

(7) Density.

(8) Mechanical properties.

(9) Thermal expansion.

(10) Abrasion.

(11) Cohesion.

(12) Thermal conductivity.

(13) Resistance to vibrations.

(14) Resistance to fire and flame spread.

(15) The manufacturing and installation details of the insulation that includes—

(i) Fabrication; (ii) Storage; (iii) Handling; (iv) Erection; and (v) Quality control.

SUPPORT SYSTEM

§ 154.470 General.

(a) A tank must have a support system that—

(1) Prevents movement of the tank under static and dynamic loads in § 154.406; and

(2) Allows the tank to contract and expand from temperature variation and hull deflection without exceeding the design stress of the tank and the hull.

(b) The tank support system must have a key that prevents rotation of the tank.

(c) An independent tank must have supports with an antiflotation system that withstands the upward force of the tank without deformation of the hull when the tank is—

(1) Empty; and

(2) In a hold space flooded to the summer load draft of the vessel.

§ 154.471 Design criteria.

(a) The tank support system must be designed—

(1) For the loads in § 154.406(a);

(2) To not exceed the allowable stress at a static angle of heel of 30°;

(3) To withstand a collision force equal to at least one-half the weight of the tank and cargo from forward and one-quarter the weight of the tank and cargo from aft; and

(4) For the largest resulting acceleration in Figure 1, including rotational and translation effects.

(b) The tank support design loads in paragraph (a) of this section may be analyzed separately.

§ 154.476 Cargo transfer devices and means.

(a) If a cargo pump in a tank is not accessible for repair when the tank is in use, the tank must have an additional means of cargo transfer, such as another pump or gas pressurization.

(b) If cargo is transferred by gas pressurization, the pressurizing line must have a safety relief valve that is set at less than 90 percent of the tank relief valve setting.

CARGO AND PROCESS PIPING SYSTEMS

§ 154.500 Cargo and process piping standards.

The cargo liquid and vapor piping and process piping systems must meet the

requirements in this subpart and the following subparts and sections in this chapter:

56.01	56.50–105
56.04	56.60
56.07	56.65
56.10	56.70
56.15	56.75
56.20	56.80
56.25	56.85
56.30	56.90
56.35	56.95
56.50–20	56.97

§ 154.503 Piping and piping system components: Protection from movement.

The piping and piping system components and cargo tanks must be protected, where thermal movement and movements of the tank and the hull structure may cause stresses, that exceed the design stresses by—

(a) Offsets; (b) Loops; (c) Bends; (d) Mechanical expansion joints including—

(1) Bellows; (2) Slip joints; or (3) Ball joints; or (e) Other means specially approved by the Commandant (G–MMT).

§ 154.506 Mechanical expansion joint: Limits in a piping system.

The number of mechanical expansion joints in a piping system must be specially approved by the Commandant (G–MMT).

§ 154.508 Mechanical expansion joint: Bellows type.

(a) Mechanical expansion joints in a piping system outside of a cargo tank must be a bellows type.

(b) A bellow expansion joint in a piping system outside of a cargo tank must be protected from icing by—

(1) Insulation;

(2) A cover; or

(3) Other means specially approved by the Commandant (G–MMT).

§ 154.512 Piping: Thermal isolation.

Low temperature piping must be thermally isolated from any adjacent hull structure to prevent the temperature of that structure from dropping below the design temperature of the hull material.

§ 154.514 Piping: Electrical bonding.

(a) Tanks or piping that are separated from the hull structure by thermal isolation must be electrically bonded to the hull structure.

(b) A pipe joint or a hose connection that has a gasket must have an electrical bond.

§ 154.516 Piping: Hull protection.

A vessel's hull must be protected from low temperature liquid leakage by a drip pan, or other means specially approved by the Commandant (G–MMT), at—

(a) Any piping connection dismantled on a routine basis;

(b) Cargo discharge and loading manifold; and

(c) Pump seals.

§ 154.517 Piping: Liquid pressure relief.

The cargo loading and discharge crossover headers, cargo hoses, and cargo loading arms must have means to relieve cargo pressure and to remove liquid cargo.

§ 154.519 Piping relief valves.

(a) The liquid relief valve that protects the cargo piping system from liquid pressure exceeding the design pressure must discharge into a tank.

(b) A liquid relief valve may discharge into a cargo vent mast if that vent mast has a means for the detection and removal of the liquid cargo that is specially approved by the Commandant (G–MMT).

(c) A relief valve on a cargo pump that protects the cargo piping system must discharge into the pump suction.

§ 154.520 Piping calculations.

A piping system must be designed to meet the allowable stress values under § 56.07–10 of this chapter and, if the design temperature is $-110°$ C ($-166°$ F) or lower, the stress analysis must include—

(a) Pipe weight loads;

(b) Acceleration loads;

(c) Internal pressure loads;

(d) Thermal loads; and

(e) Loads from the hull.

§ 154.522 Materials for piping.

(a) The materials for piping systems must meet § 154.625 for the minimum design temperature of the piping, except the material for open ended vent piping may be specially approved by the Commandant (G–MMT) if—

(1) The temperature of the cargo at the pressure relief valve setting is $-55°$ C ($-67°$ F) or warmer; and

(2) Liquid can not discharge to the vent piping.

(b) Materials for piping outside the cargo tanks must have a melting point of at least 925° C (1697° F), except for such short lengths of pipes with fire resisting insulation that are attached to the cargo tanks.

§ 154.524 Piping joints: Welded and screwed couplings.

Pipe lengths without flanges must be joined by a—

(a) Butt welded joint with complete penetration at the weld root, except that for design temperatures colder than $-10°$ C (14° F) the butt weld must be double welded or must have an equivalent to a double welded butt joint by use of—

(1) A backing ring that for design pressures greater than 10 kp/cm² (142 psig) must be removed after the weld is completed;

(2) A consumable insert; or

(3) An inert gas back-up on the first weld pass;

(b) Slip on welded joint with sleeves and attachment welds allowed for an open ended pipe with an external diameter of 50 mm (2 in.) or less and a design temperatures at $-55°$ C ($-67°$ F) or warmer; or

(c) Screwed coupling that meets §§ 56.30–20 and 56.50–105 (a) (4) and (b) (4) of this chapter.

§ 154.526 Piping joints: Flange connection.

Flange connections for pipe joints must meet §§ 56.30–10 and 56.60–105 (a) (4) and (b) (4) of this chapter.

§ 154.528 Piping joints: Flange type.

(a) A flange must be one of the following types:

(1) Welding neck.

(2) Slip-on.

(3) Socket weld.

(b) If the design temperature of the piping is between $-10°$ C (14° F) and $-55°$ C ($-67°$ F), the pipe flange may be a—

(1) Slip-on type, if the nominal pipe size is less than 100 mm (4 in.);

(2) Socket weld, if the nominal pipe size is less than 50 mm (2 in.); or

(3) Welding neck.

(c) If the design temperature of the piping is lower than $-55°$ C ($-67°$ F), the pipe flange must be a welding neck type.

§ 154.530 Valves: Cargo tank MARVS 0.7 kp/cm² (10 psig) or lower.

(a) Liquid and vapor connections on a cargo tank with a MARVS of 0.7 kp/cm² (10 psig) or lower, except connections for safety relief valves and liquid level gauging devices, must have shut-off valves that—

(1) Close;

(2) Are located as close to the tank as practicable; and

(3) Have manual control at the valve.

(b) The cargo piping system for a cargo tank with a MARVS of 0.7 kp/cm² (10 psig) or lower must have at least one remotely controlled quick closing shut-off valve for closing liquid and vapor piping between vessel and shore that meets §§ 154.540, 154.542, and 154.544.

§ 154.532 Valves: Cargo tank MARVS greater than 0.7 kp/cm² (10 psig).

(a) Liquid and vapor connections on a cargo tank with a MARVS greater than 0.7 kp/cm² (10 psig), except connections for safety relief valves and liquid level gauging devices, must have as close to the tank as practicable, a—

(1) Manual controlled stop valve; and

(2) Remotely controlled quick-closing shut-off valve.

(b) If the nominal pipe size of a liquid or vapor connection is less than 50 mm (2 in.), an excess flow valve may be substituted for the quick closing valve required under paragraph (a) of this section.

(c) A single valve may be substituted for the manual controlled stop valve and the remotely controlled quick-closing shut-off valve required under paragraph (a) of the section if that single valve—

(1) Meets §§ 154.540, 154.542, and 154.544; and

(2) Is also manually controlled.

§ 154.534 Cargo pumps and compressors.

Cargo pumps and compressors must shut down automatcially when the quick-closing shunt-off valves required under §§ 154.530 and 154.532 are closed by the

emergency shut-down system required under § 154.540.

§ 154.536 Tank gauging and measuring connections.

Unless the outward flow from a tank is less than the flow through a circular hole of 1.4 mm (.055 in.), in diameter, tank connections for gauging or measuring devices must have excess flow or quick-closing shut-off valves.

§ 154.538 Cargo transfer connection.

A cargo transfer connection must have a—

(a) Remotely controlled quick-closing shut-off valve; or

(b) Blank flange.

§ 154.540 Quick-closing shut-off valves: Emergency control system.

(a) The remotely controlled quick-closing shut-off valve required under §§ 154.530, 154.532, and 154.538 must have an emergency control system to operate the valve.

(b) The control system required under paragraph (a) of this section must be in—

(1) The cargo control station; and

(2) At least one other remote location on the vessel.

(c) The quick-closing shut-off valve required under §§ 154.530, 154.532, and 154.538 must—

(1) Be the fail-closed type; and

(2) Have manual control.

§ 154.542 Quick-closing shut-off valves: Emergency control system fusible elements.

The control system required under § 154.540 must have fusible elements at each tank dome and cargo loading and discharge manifold that melt between 98° C (208° F) and 104° C (220° F) and close the quick-closing shut-off valves.

§ 154.544 Quick-closing shut-off valves: Closing time.

A quick-closing shut-off valve in liquid cargo piping must close from the open position in at least 30 seconds or less.

§ 154.546 Excess flow valve: Closing flow.

(a) The rated closing flow of vapor or liquid cargo for an excess flow valve must be specially approved by the Commandant (G-MMT).

(b) An excess flow valve allowed under § 154.532 must close automatically at the rated closing flow.

§ 154.548 Cargo piping: Flow capacity.

Piping with an excess flow valve must have a vapor or liquid flow capacity that is greater than the rated closing flow required under § 154.546.

§ 154.550 Excess flow valve: Bypass.

An excess flow valve allowed under § 154.532(b) may have a bypass of 1.0 mm (.0394 in.) or less in diameter.

§ 154.552 Liquid and vapor cargo hose: Compatibility.

Liquid and vapor cargo hoses must—

(a) Not chemically react with the cargo; and

(b) Withstand cargo temperature.

§ 154.554 Cargo hose: Bursting pressure.

Cargo hose that can be pressurized by the tank, the cargo pump discharge, or the vapor compressor discharge must have a bursting pressure of at least five times the maximum working pressure on the hose during cargo transfer.

§ 154.556 Cargo hose: Maximum working pressure.

A cargo hose must have a maximum working pressure not less than the maximum pressure to which it may be subjected and at least 10.5 kp/cm² (150 psig).

§ 154.558 Cargo hose: Marking.

Each cargo hose must be marked with the—

(a) Maximum working pressure; and

(b) Minimum service temperature for service at other than ambient temperature.

§ 154.560 Cargo hose: Prototype test.

Each cargo hose must be of a type that passes a prototype test at a pressure of at least five times its maximum working pressure to at least the service temperature.

§ 154.562 Cargo hose: Hydrostatic test.

Each cargo hose must pass a hydrostatic pressure test of at least 1.5 times its specified maximum working pressure but not more than two-fifths its bursting pressure and at ambient temperature.

MATERIALS

§ 154.605 Toughness test.

(a) Each toughness test for material used to meet the requirements of §§ 154.610 through 154.625 must meet Subpart 54.05 of this chapter.

(b) The Charpy V-notch energy for subsize toughness test specimens must meet Table 56.50-105(a) of this chapter.

§ 154.610 Design temperature not colder than 0° C (32° F).

(a) Plates, pipes, tubes, forgings, forged and rolled fittings, rolled and forged bars and shapes, and castings used in the construction of tanks and process pressure vessels for a desgin temperature not colder than 0° C (32° F) must be carbon manganese steel, made with fine grain practice, austenitic grain size of five or finer where the thickness exceeds 20 mm (.787 in.), and normalized or quenched and tempered. A control rolling procedure may be substituted for normalizing if specially approved by the Commandant (G-MMT). Plate for an independent tank type C and process pressure vessel must also meet the requirements of ASTM A-20 and § 54.01-18 (b) (5) of this chapter.

(b) A recognized classification society's grades D, up to 20 mm (.787 in.), and E hull structural steel may be used for an independent type A tank if the steel is tested under § 54.05-10 of this chapter.

(c) A tensile test must be made for—

(i) Each plate as rolled; and

(ii) Each five short ton batch of forgings, forged or rolled fittings, rolled or forged bars and shapes, and castings.

(d) The minimum specified yield stress must not exceed 65 kp/mm² (92.43 Ksi) and when it exceeds 50 kp/mm² (71.10 Ksi) the hardness of the weld and heat affected zone must be specially approved by the Commandant (G-MMT).

(e) A Charpy V-notch test must be made for—

(1) Each plate as rolled; and

(2) Each five short ton batch of forgings, forged or rolled fittings, rolled or forged bars and shapes, and castings.

(f) The orientation and required impact energy of a 10 mm x 10 mm (.394 in. x .394 in.) Charpy V-notch specimen is as follows:

(1) Plate, transverse specimen, 2.8 kpm (20 ft-lbs).

(2) Forgings, forged and rolled fittings, rolled and forged bars and castings, longitudinal specimen, 4.2 kpm (30 ft-lbs).

(g) The test temperature of the Charpy V-notch specimens is as follows:

MATERIAL THICKNESS AND TEST TEMPERATURE
$t \leq 20$ mm (.788 in.), 0° C (32° F)
$20 < t \leq 30$ mm (1.182 in.), −20° C (−4° F)
$30 < t \leq 40$ mm (1.576 in.) −40° C (−40° F)

§ 154.615 Design temperature below 0° C (32° F) and down to −55° C (−67° F).

Plates, forgings, forged or rolled fittings, rolled or forged bars and shapes, and castings for tanks, secondary barriers, and process pressure vessels with a design temperature below 0° C (32° F) and down to −55° C (−67° F) must meet the material requirements in § 54.25-10 of this chapter.

§ 154.620 Design temperature below −55° C (−67° F) and down to −165° C (−265° F).

Plates, forgings and forged or rolled fittings, rolled or forged bars and shapes, and castings for tanks, secondary barriers, and process pressure vessels with a design temperature below −55° C (−67° F) and down to −165° C (−265° F) must meet § 54.25-10(b)(2), § 54.25-15, or § 54.25-20 of this chapter.

§ 154.625 Design temperature below 0° C (32° F) and down to −165° C (−265° F).

Pipes, tubes, forgings, castings, bolting, and nuts for cargo process piping with a design temperature below 0° C (32° F) and down to −165° C (−265° F) must meet § 56.50-105 of this chapter.

§ 154.630 Tank material.

(a) If a material of a tank is not listed in §§ 154.610, 154.615 or 154.620, the allowable stress of that material must be specially approved by the Commandant (G-MMT).

(b) Material in the area of welded connections in aluminum alloys must have the tensile strength of the annealed condition.

(c) Increased yield stress and tensile strength of a material at low tempera-

ture for independent tanks type A, B and C must be specially approved by the Commandant (G-MMT).

CONSTRUCTION

§ 154.650 Tank and process pressure vessel welding.

(a) Tank and process pressure vessel welding must meet Subpart 54.05 and Part 57 of this chapter.

(b) Welding consumables for welding tanks must meet §57.02-4 of this chapter.

(c) For independent tanks—

(1) Each welded joint of the shells must be a full penetration butt weld, except that full penetration tee welds may be used for dome to shell connections; and

(2) Each nozzle weld must be of the full penetration type, except for small penetrations on domes.

(d) For independent tanks type C and process pressure vessels, each welded joint must meet Part 54 of this chapter, except that any backing rings must be removed unless specially approved by the Commandant (G-MMT).

(e) For each welded joint in a membrane tank, the quality assurance measures, weld procedure qualification, design details, materials, construction, inspection, and production testing of components must meet the standards developed during the prototype testing program that are specially approved by the Commandant (G-MMT).

(f) For semi-membrane tanks, each welded joint must meet paragraph (c) or (e) of this section.

§ 154.655 Stress relief for independent tanks type C.

For a design temperature colder than −10° C (14° F), an independent tank type C of —

(a) Carbon and carbon-manganese steel must be stress relieved by post-weld heat treatment under § 54.25-7 of this chapter or mechanical stress relief under Subpart 54.30; or

(b) Materials other than carbon and carbon manganese steel must be stress relieved using a procedure specially approved by the Commandant (G-MMT).

§ 154.660 Pipe welding.

(a) Pipe welding must meet Part 57 of this chapter.

(b) Butt welds of pipes made from carbon, carbon manganese, or low alloy steels must be post-weld heat treated and must meet § 56.50-105 and Subpart 56.85 of this chapter.

(c) In addition to normal controls before and during the welding and to the visual inspection of the finished welds, the following tests are required as necessary for proving that the welding has been carried out correctly:

(1) A piping system with a service temperature lower than −10° C (14° F) and a wall thickness greater than 10 mm (.394 in.) or with an inside diameter greater than 100 mm (4 in.) must have 100 percent radiographic testing for butt welded joints.

(2) When Table 4 references this section, butt welded joints for deck cargo piping exceeding 75 mm (3 in.) in diameter must be 100 percent radiographic tested.

(3) For other butt welded joints of pipes, the non-destructive testing must meet Subpart 56.95 of this chapter.

§ 156.665 Welding procedures.

Welding procedure tests for tanks with a design temperature colder than 0° C (32° F), process pressure vessels, and piping must meet § 54.05-15 and Subpart 57.06 of this chapter.

CARGO PRESSURE AND TEMPERATURE CONTROL

§ 154.701 Cargo pressure and temperature control: General.

(a) Each refrigeration system must—(LNG) tank, must—

(1) Have a refrigeration system that meets § 154.702; or

(2) Be an independent tank type C having a P_o greater than the vapor pressure of the cargo at 45° C (113° F).

(b) The vessel must have a separate refrigeration system for each refrigerated incompatible cargo.

§ 154.702 Refrigerated carriage.

(a) Each refrigerated system must—

(1) Have enough capacity to maintain the cargo pressure below P_o under ambient design temperatures of 45° C (113° F) still air and 32° C (89.6° F) still water with the largest unit in the system inoperative; or

(2) Have a standby unit with a capacity at least equal to the capacity of the largest refrigeration unit operating in the system.

(b) For the purpose of this section, a "refrigeration unit" includes a compressor and its motors and controls.

(c) Each refrigeration system must—

(1) Have a heat exchanger with an excess capacity of 25 percent; or

(2) A standby heat exchanger.

(d) Where cooling water is used in a refrigeration system—

(1) The cooling water pump or pumps must be used exclusively for the system;

(2) Each pump must have suction lines from seachests on the port and starboard sides of the vessel; and

(3) The vessel must have a standby pump, which may be a pump that is used for other, non-essential purposes.

(e) Each refrigeration system must use refrigerants that are compatible with the cargo and, for cascade units, with each other.

(f) Each refrigeration system must have automatic and manual cargo temperature controls.

(g) The pressure of the heat transfer fluid in each cooling coil in a tank must be greater than the pressure of the cargo.

§ 154.703 Methane (LNG).

Unless a tank carrying methane (LNG) can withstand the pressure build up due to boil-off for 21 days, the pressure in the tank must be maintained below P_o for at least 21 days by—

(a) A refrigeration system that meets § 154.702;

(b) Burning boil-off gas in a waste heat or catalytic furnace that—

(1) Maintains the stack exhaust temperature below 535° C (995° F);

(2) Exhibits no visible flame; and

(3) Is specially approved by the Commandant (G-MMT); or

(c) Using the boil-off gas as fuel in boilers, inert gas generators, and combustion engines in the main propelling machinery space or for other services and in other spaces specifically approved by the Commandant (G-MMT).

§ 154.705 Cargo boil-off as fuel: General.

(a) Each cargo boil-off fuel system used to meet § 154.703(c) must meet §§ 154.706 through 154.709.

(b) The piping must have a connection for introducing inert gas and gas freeing the piping in the machinery space.

(c) A gas fired main propulsion boiler or combustion engine must have a fuel oil fired pilot to maintain fuel flow if gas fuel supply is cut off.

§ 154.706 Cargo boil-off as fuel: Fuel lines.

(a) Gas fuel lines must not pass through accommodation, service, or control spaces. A gas line passing through other spaces must meet one of the following:

(1) The fuel line must be a double-walled piping system with the annular space containing an inert gas at a pressure greater than the fuel pressure. Visual and audible alarms must be installed at the machinery control station to indicate loss of inert gas pressure.

(2) The fuel line must be installed in a mechanically exhaust ventilated pipe or duct, having a rate of air change of at least 30 changes per hour. The pressure in the space between the inner pipe and outer pipe or duct must be maintained at less than atmospheric pressure. If the required air flow is not established or maintained, the gas fuel supply must be automatically shut off. Continuous gas detection must be installed in the ventilated space to detect leaks and to automatically shut off the gas fuel supply to meet § 154.708(c). The ventilation system must meet the requirements of § 154.1205.

(b) Each double wall pipe or vent duct must terminate in the ventilation hood or casing required under § 154.707(a). Continuous gas detection must be installed in the hood or casing to indicate leaks and to shut off the gas fuel supply to meet paragraph (a)(2) of this section.

§ 154.707 Cargo boil-off as fuel: Ventilation.

(a) A ventilation hood or casing must be installed in areas occupied by flanges, valves, and piping at the fuel burner to cause air to sweep across them and be exhausted at the top of the hood or casing.

(b) The hood or casing must be mechanically exhaust ventilated and meet § 154.1205.

(c) If the air flow in the ventilated hood or casing falls below the rate specially approved by the Commandant (G-MMT), the gas fuel supply must be shut off.

§ 154.708 Cargo boil-off as fuel: Valves.

(a) Gas fuel lines to the gas consuming equipment must have two fail-closed automatic valves in series. A third valve, designed to fail-open, must vent that portion of pipe between the two series valves to the open atmosphere.

(b) These valves must be arranged so that loss of boiler forced draft, flame failure, or abnormal gas fuel supply pressure automatically causes the two series valves to close and the vent valve to open. The function of one of the series valves and the vent valve may be performed by a single three-way valve.

(c) A master gas fuel valve must be outside the machinery space, but be operable from inside the machinery space and at the valve. The valve must automatically close if leakage of gas or loss of ventilation is detected.

§ 154.709 Cargo boil-off as fuel: Gas detection equipment.

(a) The continuous gas detection system required under § 154.706 (a) (2) and (b) must—

(1) Meet § 154.1350 of this part; and

(2) Have a device that activates an audible and visual alarm at the machinery control station and in the wheelhouse if the concentration reaches 1.5 percent by volume of methane and closes the master gas fuel valve required under § 154.708(c) if the concentration reaches 3 percent by volume.

(b) The number and arrangement of gas sampling points must be specially approved by the Commandant (G-MMT).

CARGO VENT SYSTEMS

§ 154.801 Pressure relief systems.

(a) Each tank that has a volume of 20 m^3 (706 $ft.^3$) or less must have at least one pressure relief valve.

(b) Each tank that has a volume of greater than 20 m^3 (706 $ft.^3$) must have at least two pressure relief valves of equal relieving capacity.

(c) Each pressure relief valve must—

(1) Meet 46 CFR 162.018 or, if the MARVS is 0.7 kp/cm^2 (10 psig) or less, 46 CFR 162.017, and have at least the capacity required under § 154.806;

(2) Not be set for a higher pressure than the MARVS;

(3) Have a fitting for sealing wire that prevents the set relieving pressure from being changed without breaking the sealing wire;

(4) Be insulated from the tank if the temperature of the cargo carried is below 0° C (32° F);

(5) Be fitted on the tank to remain in the vapor phase under conditions of 15° list and 0.015 L trim;

(6) Vent to a vent mast under § 154.805, except a relief valve may vent to a common tank relief valve header if the back pressure is taken into account in determining the required capacity in § 154.806;

(7) Not vent to a common header or common vent mast if the relief valves are connected to tanks carrying chemically imcompatible cargoes; and

(8) Not have any stop valves or other means of isolating the tank from its relief valve unless—

(i) The stop valves are interlocked or arranged so that only one pressure relief valve is out of service at any one time;

(ii) The interlock arrangement automatically shows the relief valve that is out of service; and

(iii) The remaining valves have the relieving capacity required under § 154.806, or all valves on the tank are the same size and a spare is carried, or a spare is carried for each valve on a tank.

§ 154.802 Alternate pressure relief settings.

Tanks specially approved for more than one relief valve setting must have one of the following valve arrangements:

(a) Valves that—

(1) Are set and sealed under § 154.801(c);

(2) Have the capacity required under § 154.806; and

(3) Are interlocked so that all relief valves cannot be isolated from the tank at any time.

(b) Valves that have spacer pieces or springs that—

(1) Change the set pressure without pressure testing to verify the new setting; and

(2) Can be installed without breaking the sealing wire required under § 154.801(c)(3).

§ 154.804 Vacuum protection.

(a) Each cargo tank must have—

(1) A pressure switch that operates an audible and visual alarm in the wheelhouse and cargo control station at or below 80 percent of the maximum external design pressure differential of the cargo tanks and a second, independent pressure switch that automatically shuts off all suction of cargo liquid or vapor from the cargo tank and secures any refrigeration of that tank at or below the maximum external designed pressure differential; or

(2) A vacuum relief valve that—

(i) Has a gas flow capacity at least equal to the maximum cargo discharge rate per tank;

(ii) Is set to open at or below the maximum external designed pressure differential;

(iii) Admits inert gas, cargo vapor from a source other than a cargo vapor header, or air except as prohibited under § 154.1710.

(b) Each vacuum protection system must have a means to test its operation.

(c) Tanks designed to withstand a maximum external pressure differential exceeding 0.25 kp/cm^2 (3.55 psig) and to withstand the maximum external pressure differential that can be attained at maximum discharge rates with no vapor return to the cargo tanks, by operation of a cargo refrigeration system, or by drawing off vapors for use in accordance with § 154.703(c), are not required to have vacuum protection.

§ 154.805 Vent masts.

Relief vents or common vent headers from relief valves must discharge to a vent mast that—

(a) Discharges vertically upward;

(b) Has a rain cap or other means of preventing the entrance of rain or snow;

(c) Has a screen or bars not more than 25 mm (1 in.) apart;

(d) Extends at least to a height of B/3 or 6 m (19.7 ft.), whichever is greater, above the weather deck and 6 m (19.7 ft.) above the working level;

(e) On a tank, does not exhaust within a radius of B or 25 m (82 ft.), whichever is less, from any forced or natural ventilation intake or other opening to an accommodation, service, control station, or other gas-safe space;

(f) On a containment system, except a tank, does not exhaust within a radius of 10 m (32.8 ft.) or less from any forced or natural ventilation intake or other opening to an accommodation, service, control station, or other gas-safe space;

(g) Has drains to remove any liquid that may accumulate; and

(h) That prevents accumulations of liquid at the relief valves.

§ 154.806 Capacity of pressure relief valves.

Pressure relief valves for each tank must have a combined relief capacity, considering back pressure from vent piping, headers, and masts, to discharge the greater of the following with not more than a 20 percent rise in cargo tank pressure above the MARVS:

(a) The maximum capacity of an installed tank inerting system.

(b) Quantity of vapors generated from fire exposure that is calculated under § 54.15-25 of this chapter.

ATMOSPHERIC CONTROL IN CARGO CONTAINMENT SYSTEMS

§ 154.901 Atmospheric control within cargo tanks and cargo piping systems.

(a) Each vessel must have a piping system for gas freeing and purging of each tank and all cargo piping.

(b) The piping system must minimize the pocketing of gas or air remaining after purging.

(c) For tanks certificated to carry flammable gases, the piping system must allow purging the tank of flammable vapors before air is introduced and purging the tank of air before the tank is filled with cargo.

(d) Each cargo tank must have—

(1) Gas sampling points at the top, middle, and bottom of the tanks; and

(2) Gas sampling line connections that are valved and capped above the deck.

§ 154.902 Atmospheric control within hold and interbarrier spaces.

(a) Vessels certificated to carry flammable cargo in cargo containment systems with full secondary barriers must have an inert gas system or onboard storage of inert gas that provides enough inert gas to meet the requirements of § 154.1848 for 30 days consumption.

(b) Vessels certificated to carry flammable cargo in cargo containment systems with partial secondary barriers must—

(1) Have an inert gas system or onboard inert gas storage that can inert the largest hold and interbarrier space;

(2) Have a gas detection system for each hold and interbarrier space; and

(3) Meet the requirements of § 154.902(a) or § 154.902(c)(2).

(c) Vessels certificated to carry only non-flammable cargo in cargo containment systems with secondary barriers must—

(1) Meet the requirements of § 154.902(a); or

(2) Have air drying systems that reduce the dewpoint of any air admitted to hold or interbarrier spaces below the temperature of any surface in those spaces.

(d) Vessels with refrigerated independent tanks type C must have inert gas or air drying systems that reduce the dewpoint of any inert gas or air admitted to the hold spaces below the temperature of any surface in the hold spaces.

§ 154.903 Inert gas systems: general.

(a) Inert gas carried or generated to meet §§ 154.901, 154.902, and 154.1848 must be non-flammable and non-reactive with the cargoes that the vessel is certificated to carry and the materials of construction of the tanks, hold and interbarrier spaces, and insulation.

(b) The boiling point and dewpoint at atmospheric pressure of the inert gas must be lower than the temperature of any surface in the spaces that the gas inerts.

(c) Storage vessels and inert gas piping must meet §§ 154.400 and 154.500 for the temperatures and pressures at which the gas is stored and used.

§ 154.904 Inert gas system: Controls.

The inert gas system must have—

(a) At least two check valves, or other means specially approved by the Commandant (G-MMT), in the cargo area to prevent the back flow of cargo vapor into the inert gas system;

(b) Automatic and manual inert gas pressure controls; and

(c) Valves to isolate each inerted space.

§ 154.906 Inert gas generators.

The inert gas generator must—

(a) Produce an inert gas containing less than 5 percent oxygen;

(b) Have a device to continuously sample the discharge of the generator for oxygen content; and

(c) An audible and visual alarm in the cargo control station set at or below 5 percent oxygen by volume.

§ 154.908 Inert gas generator: Location.

(a) Except as allowed in paragraph (b) of this section, an inert gas generator must be located in a space that is not in the cargo area and does not have direct access to any accommodation, service, or control space.

(b) An inert gas generator that does not use flame burning equipment may be located in the cargo area if specially approved by the Commandant (G-MMT).

§ 154.910 Inert gas piping: Location.

Inert gas piping must not pass through or terminate in an accommodation, service, or control space.

§ 154.912 Inerted spaces: Relief devices.

Inerted spaces must be fitted with relief valves, rupture discs, or other devices specially approved by the Commandant (G-MMT).

ELECTRICAL

§ 154.1000 Applicability.

(a) Sections 154.1005 through 154.1020 apply to flammable cargo and ammonia carriers.

(b) For the purposes of §§ 154.1005 through 154.1020, an ammonia carrier is not gas-dangerous on the open deck.

§ 154.1005 Equipment approval.

(a) All electrical equipment that is required to be intrinsically safe or explosion-proof under § 154.1010 must be approved or listed by an independent laboratory that is specially approved by the Commandant (G-MMT), such as Underwriters' Laboratories, Inc. or Factory Mutual Systems, for Class I Division I locations and the Group that is specified in Table 4 for the cargo carried.

(b) Each submerged cargo pump motor installation must be specially approved by the Commandant (G-MMT).

(c) All electrical equipment that must be intrinsically safe to meet § 154.1010 must meet the definition in § 110.15-100 (i) of this chapter.

(d) All electrical equipment that must be explosion-proof to meet § 154.1010 must meet § 110.15-65(e) of this chapter.

§ 154.1010 Electrical equipment in gas dangerous space or zone.

(a) Except as allowed in this section, electrical equipment must not be installed in a gas dangerous space or zone.

(b) Intrinsically safe electrical equipment and wiring may be in a gas dangerous space or zone.

(c) A submerged cargo pump motor may be in any tank if—

(1) Low liquid level, motor current, or pump discharge pressure automatically shuts down power to the pump motor if the pump loses suction;

(2) There is an audible and visual alarm at the cargo control station that actuates if the motor shuts down under the requirements of subparagraph (1) of this paragraph; and

(3) There is a lockable circuit breaker or lockable switch that disconnects the power to the motor.

(d) A supply cable for a submerged cargo pump motor may be in a hold space.

(e) A hold space that has a tank that is not required to have a secondary barrier under § 154.459 may have—

(1) Through runs of cable;

(2) Explosion-proof lighting fixtures;

(3) Depth sounding devices in gas tight enclosures;

(4) Log devices in gas tight enclosures; and

(5) Impressed current cathodic protection system electrodes in gas tight enclosures.

(f) A space that is separated by a gas tight steel boundary from a hold space that has a tank that must have a secondary barrier under the requirements of § 154.459 may have—

(1) Through runs of cable;

(2) Explosion-proof lighting fixtures;

(3) Depth sounding devices in gas tight enclosures;

(4) Log devices in gastight enclosures;

(5) Impressed current cathodic protection system electrodes in gastight enclosures;

(6) Explosion-proof motors that operate cargo system valves or ballast system valves; and

(7) Explosion-proof bells for general alarm systems.

(g) A cargo handling room may have—

(1) Explosion-proof lighting fixtures; and

(2) Explosion-proof bells for general alarm systems.

(h) A space for cargo hose storage may have—

(1) Explosion-proof lighting fixtures; and

(2) Through runs of cable.

(i) A space that has cargo piping may have—

(1) Explosion-proof lighting fixtures; and

(2) Through runs of cable.

(j) A zone on the open deck may have—

(1) Explosion-proof equipment that is necessary for the operation of the vessel; and

(2) Through runs of cable.

(k) A space, except those named in paragraph (e) through (j) of this section, that has a direct opening to gas-dangerous space or zone may only have the electrical equipment allowed in the gas-dangerous space or zone.

§ 154.1015 Lighting in gas-dangerous space.

(a) Each gas-dangerous space that has lighting fixtures must have at least two branch circuits for lighting.

(b) Each switch and each overcurrent protective device for any lighting circuit that is in a gas-dangerous space must open each conductor of the circuit simultaneously.

(c) Each switch and each overcurrent protective device for lighting in a gas-

dangerous space must be in a gas safe space.

§ 154.1020 Emergency power.

The emergency generator must be designed to allow operation at the final angle of heel under § 154.230(a).

FIREFIGHTING

§ 154.1100 Firefighting: General.

Each vessel must meet Parts 32 and 34 of this chapter.

FIREFIGHTING SYSTEM: EXTERIOR WATER SPRAY

§ 154.1105 Exterior water spray system: General.

Each flammable liquefied gas carrier and each toxic liquefied gas carrier must have an exterior water spray system that meets §§ 154.1110 through 154.1135.

§ 154.1110 Areas protected by system.

Each water spray system must protect the following:

(a) All parts of each tank that are not covered by the vessel's hull structure or a steel cover, including the dome.

(b) Each on-deck storage vessel for flammable or toxic liquefied gases.

(c) Each cargo discharge and loading manifold.

(d) Each quick closing valve required by §§ 154.530, 154.532, and 154.538, and other control valves.

(e) Each boundary facing the cargo area of each superstructure that contains accommodation, service, or control spaces.

(f) Each boundary facing the cargo area of each deckhouse that contains accommodation, service, or control spaces.

(g) Each boundary of each deckhouse that is within the cargo area and that is manned during navigation of the vessel or during cargo transfer operations, except the deckhouse roof if it is 2.4 m (8 ft.) or higher above the main deck.

§ 154.1115 Discharge.

(a) Each water spray system must discharge at least—

(1) 10 l/m^2/min. (.25 gpm/ft.^{2}) over each horizontal surface; and

(2) 4 l/m^2/min. (.10 gpm/ft.^{2}) against each vertical surface, including water rundown if the vertical distance from the nozzles to the protected area does not exceed 3.7 m (12 ft.).

(b) The area of water spray coverage required under § 154.1110(c) and (d) for fittings and valves must be an area in a horizontal plane extending at least .5 m (19 in.) in each direction from the pipes, fittings, and valves, or the area of the drip tray, whichever is greater.

§ 154.1120 Nozzles.

Nozzles for the water spray system must be spaced to discharge the minimum density required under § 154.1115 over each part of the protected area.

§ 154.1125 Pipes, fittings, and valves.

(a) Each pipe, fitting, and valve for each water spray system must meet Part 56 of this chapter.

(b) Each water spray main that protects more than one area listed in § 154.1110 must have at least one isolation valve at each branch connection and at least one isolation valve downstream of each branch connection.

(c) Each valved cross-connection from the water spray system to the fire main must be outside of the cargo area.

(d) Each distribution piping system must be made of fire resistant and corrosion resistant materials, such as galvanized steel or galvanized iron pipe.

(e) Each water spray system must have drains, strainers, and dirt traps.

§ 154.1130 Sections.

(a) If a water spray system is divided into sections, each section must at least include all of the area of an athwartship tank grouping.

(b) If a water spray system is divided into sections, the control valves must be at a single manifold that is aft of the cargo area.

§ 154.1135 Pumps.

(a) Water to the water spray system must be supplied by—

(1) A pump that is only for use on the system;

(2) A fire pump; or

(3) Another pump specially approved by the Commandant (G-MMT).

(b) Operation of a water spray system must not interfere with simultaneous operation of the fire main system at its required capacity.

(c) Except as allowed under paragraph (d) of this section, each pump for each water spray system must have the capacity to simultaneously supply all areas named in § 154.1110.

(d) If the water spray system is divided into sections, the pump must have the capacity to simultaneously supply—

(1) All the areas in § 154.1110(c) through (g); and

(2) The largest section that includes any area listed in § 154.1110(a) and (b).

FIREFIGHTING SYSTEM: DRY CHEMICAL

§ 154.1140 Dry chemical system: General.

(a) Each liquefied flammable gas carrier must have a dry chemical firefighting system that meets §§ 154.1145 through 154.1170 and Part 56 and § 162.039 of this chapter.

(b) The plans for the dry chemical supply and distribution systems, including all controls, must be submitted under Subpart 50.20 of this chapter.

§ 154.1145 Dry chemical supply.

(a) A vessel with a cargo carrying capacity less than 1000 m^3 (35,300 ft.^{3}) must have at least one self-contained dry chemical unit for the cargo area with independent inert gas pressuring sources adjacent to the unit.

(b) A vessel with a cargo carrying capacity of 1000 m^3 (35,300 ft.^{3}) or more must have at least two self-contained dry chemical storage units for the cargo area with independent inert gas pressurizing sources adjacent to each unit.

(c) Each dry chemical system must have at least one self-contained dry chemical storage unit and independent inert gas pressurizing source for each bow and stern loading and discharge area.

(d) Each hose line and monitor of each dry chemical system that is attached to a single storage unit must operate sequentially for 45 seconds each and simultaneously for 45 seconds.

§ 154.1150 Distribution of dry chemical.

(a) All of the above deck cargo area and all cargo piping outside that cargo area must be protected by—

(1) At least two dry chemical hand hose lines that have separate dry chemical supplies; or

(2) At least one dry chemical hand hose line and one dry chemical monitor that have separate dry chemical supplies.

(b) At least one dry chemical storage unit and hand hose line or monitor must be at the after end of the cargo area and all other gas dangerous areas except stern loading areas.

(c) Each part of the cargo area must be protected by at least one dry chemical hand hose line that is aft of that part or at least one dry chemical monitor that is aft of that part.

(d) Each cargo loading and discharge manifold must be protected by at least one dry chemical monitor.

(e) Each bow loading area and each stern loading area must also be protected by at least one hand hose line.

§ 154.1155 Hand hose line coverage.

For the purposes of § 154.1150, the coverage for an area protected by each hand hose line is equal to its length, except the coverage for the protection of areas that are inaccessible to personnel is equal to one-half the projection of the hose at its rated discharge, or 10 m (33 ft.), whichever is less.

§ 154.1160 Monitor coverage of system.

For the purposes of § 154.1150, the allowed coverage of each dry chemical system monitor must not exceed—

(a) 10 m (32.8 ft.) at 10 kg/sec (22 lb/sec);

(b) 30 m (984 ft.) at 25 kg/sec (55 lb/sec);

(c) 40 m (131.2 ft.) at 45 kg/sec (99 lb/sec);

(d) An interpolation between 10 m (32.8 ft.) at 10 kg/sec (22 lb/sec) and 30 m (98.4 ft.) at 25 kg/sec (55 lb/sec);

(e) An interpolation between 30 m (98.4 ft.) at 25 kg/sec (55 lb/sec) and 40 m (131.2 ft.) at 45 kg/sec (99 lb/sec); or

(f) An extrapolation of 40 m (131.2 ft.) at 45 kg/sec (99 lb/sec).

§ 154.1165 Controls.

(a) Each dry chemical hand hose line must be one that can be actuated at its hose reel.

(b) Each dry chemical monitor must be one that can be—

(1) Actuated and controlled at the monitor; and

(2) Actuated and controlled at a location away from the monitor and the protected area, except a monitor that is pre-aimed at the manifold does not have to be controlled at a location away from the monitor and the protected area.

(c) Each dry chemical storage unit that has more than one hand hose line, monitor, or combination of hand hose line and monitor must have independent piping with a stop valve for each hand hose line or monitor, where it connects to the storage container.

(d) Each stop valve for a hose reel or monitor must have a remote control at the hose reel or monitor.

(e) Damage to any dry chemical system hose reel, monitor, pipe or control circuit must not prevent the operation of other hose reels, monitors, or control circuits that are connected to the same storage unit.

§ 154.1170 Hand hose line: General.

Each dry chemical hand hose line must—

(a) Be 33 m (108 ft.) long or less;

(b) Be operable whether or not it is unwound from a hose reel or removed from a hose cabinet;

(c) Be without kinks;

(d) Have a nozzle with a valve to start and stop the flow of chemical;

(e) Have a capacity of at least 3.5 kg/sec (7.7 lb./sec); and

(f) Be one that can be operated by one person.

CARGO AREA: MECHANICAL VENTILATION SYSTEM

§ 154.1200 Mechanical ventilation system: General.

(a) Each cargo compressor room, pump room, gas dangerous cargo control station, and space that contains cargo handling equipment must have a fixed, exhaust type, mechanical ventilation system.

(b) The following spaces must have a supply type mechanical ventilation system:

(1) Each space that contains electric motors for cargo handling equipment.

(2) Each gas-safe cargo control station.

(3) Each gas-safe space in the cargo area.

(4) Each space that contains inert gas generators, except main machinery spaces.

§ 154.1205 Mechanical ventilation system: Standards.

(a) Each exhaust type mechanical ventilation system required under § 154.1200(a) must have ducts for vapors from the following:

(1) The deck level.

(2) Bilges.

(3) If the vapors are lighter than air, the top of each space that personnel enter during cargo handling operations.

(b) The discharge end of each duct must be at least 10 m (32.8 ft.) from ventilation intakes and openings to accommodation, service, control station, and other gas-safe spaces.

(c) Each ventilation system for any cargo handling space must change all the air in that space and its adjoining trunks at least 30 times each hour.

(d) Each ventilation system for gas-safe cargo control station must be one that can change all the air in that space at least eight times each hour.

(e) A ventilation system must not recycle vapor from ventilation discharges.

(f) Each ventilation system must have operation controls outside the ventilated space.

(g) No ventilation duct for a gas-dangerous space may pass through any machinery, accommodation, service, or control space, except as allowed under § 154.703.

(h) Each electric motor that drives a ventilation fan must be outside ducts for any space that may contain flammable cargo vapors.

(i) Ventilation impellers and the housing in way of these impellers on flammable cargo carrier must meet one of the following:

(1) The impeller, housing, or both must be made of non-metallic material that does not generate static electricity.

(2) The impeller and housing must be made of non-ferrous material.

(3) The impeller and housing must be made of austenitic stainless steel.

(4) The impeller and housing must be made of ferrous material and have at least 13mm (.512 in.) of tip clearance.

(j) No ventilation fan may have any combination of fixed or rotating components made of an aluminum or magnesium alloy and ferrous fixed or rotating components.

(k) Each ventilation intake and exhaust must have a protective metal screen of not more than 13mm (.512 in.) square mesh.

§ 154.1210 Hold space, void space, cofferdam, and space that contains cargo piping.

(a) Each hold space, void space, cofferdam, and space that contains cargo piping must have—

(1) A fixed mechanical ventilation system; or

(2) A fixed ducting system that has a portable blower that meets § 154.1205(i) and (j).

(b) A portable blower in any personnel access opening must not reduce the area of that opening so that the opening does not meet § 154.308.

INSTRUMENTATION

§ 154.1300 Liquid level gauges: General.

(a) If Table 4 lists a closed gauge for a cargo, the liquid level gauges required by § 154.1305 must be closed gauges that do not have any opening through which cargo liquid or vapor could escape, such as an ultrasonic device, float type device, electronic or magnetic probe, or bubble tube indicator.

(b) If Table 4 lists a restricted gauge for a cargo, the liquid level gauges required by § 154.1305 must be closed gauges that meet paragraph (a) of this section or restricted gauges that do not vent the tank's vapor space, such as a fixed tube, slip tube, or rotary tube.

§ 154.1305 Liquid level gauges: Standards.

(a) Each tank must have at least one liquid level gauge that operates—

(1) At pressures that are equal to or greater than the MARVS of that tank; and

(2) At temperatures that are within the cargo handling temperature range for all cargoes carried.

(b) Each tank must have at least two liquid level gauges, unless the tank has one liquid level gauge that can be repaired and maintained while the tank contains cargo.

(c) Each required liquid level gauge must measure liquid levels from 100 mm (4 in.) or less of the tank bottom to 100 percent full.

§ 154.1310 Closed gauge shutoff valve.

Each closed gauge that is not mounted directly on the tank must have a shutoff valve that is as close as practicable to the tank.

§ 154.1315 Restricted gauge excess flow valve.

Each restricted gauge that penetrates a tank must have an excess flow valve, unless the gauge has no opening greater than 1.5 mm (.059 in.) in diameter through which liquid or vapor can escape.

§ 154.1320 Sighting ports, tubular gauge glasses, and flat plate type gauge glasses.

(a) Tanks may have sighting ports or a secondary means of liquid level gauging in addition to the gauges required under § 154.1305 if —

(1) The tank has a MARVS that is less than 0.7 kg/cm² (10 psig);

(2) The port has a protective cover and an internal scale; and

(3) The port is above the liquid level.

(b) Tubular gauge glasses must not be used as liquid level gauges for tanks.

(c) The plate type gauge glasses must not be used as liquid level gauges for tanks, except deck tanks if the glasses have excess flow valves.

§ 154.1325 Liquid level alarm: All tanks.

Except as allowed under § 154.1330, each cargo tank must have a high liquid level alarm that—

(a) Is independent of the liquid level gauge required under § 154.1305;

(b) Actuates an audible and visual alarm at the cargo control station before the liquid level in the tank reaches the maximum filling limit allowed under § 154.1844; and

(c) Actuates the quick closing valves required under §§ 154.580, 154.582, and 154.588 before the tank becomes liquid full and without causing the pressure in the loading lines to exceed the design pressure.

§ 154.1330 Liquid level alarm: Independent tank type C.

Independent tank type C need not have the high liquid level alarm required under § 154.1325 if—

(a) The tank volume is less than 200 m³ (17,060 ft.³); or

(b) The tank can withstand the maximum possible pressures during loading, that pressure is below the relief valve setting, and overflow of the tank cannot occur.

§ 154.1335 Pressure and vacuum gauge.

(a) The vapor space of each tank must have a pressure gauge and, if vacuum protection is required under § 154.804, a vacuum gauge that—

(1) Can be read at the tank; and

(2) Have the remote readouts at the cargo control station.

(b) The vessel must have at least one high pressure alarm that—

(1) Actuates before the pressure in any tank exceeds the maximum pressure specially approved by the Commandant (G-MMT); and

(2) Actuates an audible and visual alarm in the wheelhouse and at the cargo control station.

(c) If vacuum protection is required under § 154.804, each vessel must have at least one low pressure alarm that—

(1) Actuates before the pressure in any tank falls below the minimum pressure specially approved by the Commandant (G-MMT); and

(2) Actuates an audible and visual alarm in the wheelhouse and the cargo control station.

(d) At least one pressure gauge must be fitted on each—

(1) Enclosed hold;

(2) Enclosed interbarrier space;

(3) Cargo pump discharge line;

(4) Liquid cargo manifold; and

(5) Vapor cargo manifold.

(e) There must be a local manifold pressure gauge between each manifold stop valve and each hose connection to the shore.

§ 154.1340 Temperature measuring devices.

(a) Each tank must have at least two devices that measure the temperature—

(1) At the bottom of the tank; and

(2) Near the top of the tank and below the maximum liquid level allowed under § 154.1844.

(b) Each device required by paragraph (a) must have a read-out at the cargo control station.

(c) Except independent tanks type C, each cargo containment system that carries cargo at temperatures colder than -55° C (—67° F) must have temperature measuring devices as follows:

(1) the number and location of the devices must be specially approved by the Commandant (G-MMT).

(2) The devices must be within the tank's insulation or on the adjacent hull structure.

(3) Each device must show the temperature continuously or at regular intervals of one hour or less.

(4) Each device must actuate an audible and visual alarm at the cargo control station before the temperature of the steel of the adjacent hull structure goes below the lowest temperature allowed for the steel under § 154.172.

(d) Each tank that carries cargo at temperatures colder than -55° C (-67° F) must have the number and arrangement of the devices that show the temperature of the tank during cool down procedures specially approved by the Commandant (G-MMT).

(e) One tank on the first vessel of a class of vessels must have in addition to the devices required by paragraph (d) of this section, devices that show the temperature of the boundary for verification of the cool down procedure.

§ 154.1345 Gas detection.

(a) For a vessel that carries a cargo that has an "I" or "I and T" in Table 4, the vessel must have—

(1) A fixed flammable gas detection system that meets § 154.1350; and

(2) Two portable gas detectors that can each measure 0 to 100 percent of the lower flammable limit of the cargo carried.

(b) For a vessel that carries a cargo that has a "T" or "I and T" in Table 4, the vessel must have—

(1) Two portable gas detectors that show if the concentration of cargo is above or below the threshold limit value listed in 29 CFR Part 1910 for that cargo; and

(2) Fixed gas sampling tubes in each hold space and interbarrier space as follows:

(i) The number of tubes must be specially approved by the Commandant (G-MMT).

(ii) Each tube must be valved and caped above the main deck unless it is connected to a fixed toxic gas detector.

(iii) If the vessel carries cargo that is heavier than the atmosphere of the space, each tube must have its open and in the lower part of the space.

(iv) If the vessel carries cargo that is lighter than the atmosphere of the space, each tube must have its open end in the upper part of the space.

(v) If the vessel carries cargo that is heavier than the atmosphere of the space and cargo that is lighter than the atmosphere of the space, each space must have tubes with their open ends in the lower part of the space and tubes with their open ends in the upper part of the space.

(vi) If the vessel carries cargo that can be both heavier and lighter than the atmosphere of the space, each space must have tubes with their open ends in the lower part of the space and tubes with their open ends in the upper part of the space.

(c) A vessel that carries methyl bromide or sulphur dioxide must have a fixed gas detection system that meets § 154.1350, except paragraph (1), and be in a gas safe cargo control station.

(d) Each alarm required by § 154.1350(d) on a vessel that carries methyl bromide and sulphur dioxide must be set or below the threshold limit value listed in 29 CFR Part 1910 for the cargo carried.

§ 154.1350 Flammable gas detection system.

(a) The vessel must have a fixed flammable gas detection system that has sampling points in—

(1) Each cargo pump room;

(2) Each cargo compressor room;

(3) Each motor room for cargo handling machinery;

(4) Each cargo control station that is not gas-safe;

(5) Each hold space, interbarrier space, and other enclosed space in the cargo area if the vessel has tanks other than independent tanks Type C; and

(6) Each space between the doors of an air lock required under § 154.345.

(b) The sampling points required under paragraph (a) of this section must meet § 154.1345(b)(2)(iii) through (vi).

(c) Gas sampling lines for the flammable gas detection system must not pass through any gas safe spaces, except gas safe cargo control rooms.

(d) Each flammable gas detection system must have audible and visual alarms that are actuated before or when the cargo is at a concentration that is equivalent to 30 percent of the lower flammable limit in air of the cargo carried.

(e) The visual alarm required by paragraph (d) of this section that is at a gas detector readout location must visually identify the space in which there is an alarm condition.

(f) Each flammable gas detection system must have an audible and a visual alarm for power failure and loss of gas sampling flow.

(g) Audible and visual alarms required under paragraphs (d) and (f) of this section must be—

(1) In each wheelhouse;

(2) In each cargo control station; and

(3) At each gas detection readout location.

(h) Each flammable gas detection system must monitor each sampling point at 30 minute or shorter intervals.

(i) All electrical equipment for each flammable gas detection system that is in a gas dangerous space or area must meet §§ 154.1000 through 154.1015.

(j) Each flammable gas detection system must have enough flame arrestors to protect all gas sampling lines.

(k) Each flammable gas detection system must have a filter that removes particulate matter in each gas sampling line.

(l) Each filter required by paragraph (k) of this section must be where it is removable during vessel operation unless it can be freed by back pressure.

(m) Each flammable gas detection system in a gas-safe cargo control station or wheelhouse must—

(1) Have a shut-off valve in each sampling line from an enclosed space, such as a hold or interbarrier space; and

(2) Exhaust gas to a safe location in the open atmosphere and away from all ignition sources.

(n) Each flammable gas detection system must not have common sampling lines, except sampling lines may be manifolded at the gas detector location if each line has an automatic valve that prevents cross-communication between sampling points.

(o) [Reserved]

(p) Each flammable gas detection system must have at least one connection for injecting zero gas and span gas into the system for testing and calibration.

(q) Each flammable gas detection system must have span gas for testing and calibration that is a known concentration of the cargo carried or the span gas recommended by the manufacturer of the flammable gas analyzer.

(r) The calibration test procedure and recommendation for type and concentration of span gas of the manufacturer of the flammable gas analyzer for each flammable gas detection system must be posted on or in the gas analyzer cabinet.

(s) Each flammable gas detection system must have a flow meter in each gas sampling line.

(t) Each flammable gas detection system must measure concentrations of 0 to 100 percent of the lower flammable limit of the cargo carried.

(u) In each hold and each interbarrier space that contains tanks other than independent tanks Type A, B, or C, the flammable gas detection system must measure concentrations of 0 to 100 percent by volume of the cargo carried by—

(1) An analyzer other than the one required under paragraph (t) of this section; or

(2) The analyzer required by paragraph (t) of this section with a scale switch that automatically returns the analyzer to 0 to 100 percent of the lower flammable limit scale when released.

§ 154.1360 Oxygen analyzer.

The vessel must have a portable analyzer that measures oxygen levels of 10 to 20 percent by volume in an inert atmosphere.

§ 154.1365 Audible and visual alarms.

(a) Each audible alarm must be one that can be turned off after sounding an alarm.

(b) Each visual alarm must be one that only can be turned off after the fault that actuated it is cleared.

(c) Each visual alarm must be marked to show the type and location of each fault that can actuate it.

(d) Each vessel must have means for testing each alarm.

§ 154.1370 Pressure gauge and vacuum gauge marking.

Each pressure gauge and vacuum gauge required by § 154.1335(a) must be marked with the maximum and minimum pressures that are specified on the vessel's certificate for the cargo carried.

§ 154.1375 Read-out for temperature measuring device marking.

Each read-out required by § 154.1340 for a device that measures temperature in a tank must be marked with the lowest temperature specified for the tank on the vessel's certificate.

SAFETY EQUIPMENT

§ 154.1400 Safety equipment: All vessels.

(a) A vessel of less than 25,000 m^3 cargo capacity must have the following personnel safety equipment:

(1) Six self-contained air-breathing apparatus each having a capacity of at least 1200 liters (42.36 ft^3).

(2) Nine spare bottles of air for the self-contained air-breathing apparatus on board.

(3) Six steel-cored lifelines.

(4) Six three-cell, explosive proof flashlights with the Underwriters' Laboratories, Inc., label for Class I Division I and the Group listed in Table 4 for the cargoes carried.

(5) Three fire axes.

(6) Six helmets that meet the specifications of ANSI Safety Requirements for Industrial Head Protection, Z-89.1 (1969).

(7) Six sets of boots and gloves that are made of rubber or other electrically non-conductive material.

(8) Six sets of goggles that meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1 (1968).

(9) Three outfits that protect the skin from scalding steam and the heat of fire, and that have a water resistant outer surface.

(10) Three chemical protective outfits.

(b) A vessel of 25,000 m^3 cargo capacity or more must have the following personnel safety equipment:

(1) Eight self-contained air-breathing apparatus that each have a capacity of at least 1200 liters (42.36 ft^3).

(2) Nine spare bottles of air for the self-contained air-breathing apparatus on board.

(3) Eight steel-cored lifelines.

(4) Eight three-cell, explosive proof flashlights with the Underwriters' Laboratories, Inc., label for the Group listed in Table 4 for the cargoes carried.

(5) Five fire axes.

(6) Eight helmets that meet the specifications of ANSI Safety Requirements for Industrial Head Protection, Z-89.1 (1969).

(7) Eight sets of boots and gloves that are made of rubber or other electrically non-conductive material.

(8) Eight sets of goggles that meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1 (1968).

(9) Five outfits that protect the skin from scalding steam and the heat of fire, and that have a water resistant outer surface.

(10) Three chemical protective outfits.

(c) When Table 4 references this section, a vessel carrying the referenced cargo must have the following additional personnel protection equipment:

(1) Three self-contained air-breathing apparatus that each have a capacity of at least 1200 liters (42.36 ft^3).

(2) Nine spare bottles of air for the self-contained air-breathing apparatus on board.

(3) Three steel-cored lifelines.

(4) Three three-cell, explosive proof flashlights with the Underwriters' Laboratories, Inc., label for the Group listed in Table 4 for the cargoes carried.

(5) Three helmets that meet the specifications of ANSI Safety Requirements for Industrial Head Protection, Z-89.1 (1969).

(6) Three sets of boots and gloves that are made of other electrically non-conductive material.

(7) Three sets of goggles that meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1 (1968).

(8) Three chemical protective outfits.

§ 154.1405 Respiratory protection.

When Table 4 references this section, a vessel carrying the referenced cargo must have—

(a) Respiratory protection equipment for the cargoes carried for every person on board; and

(b) Two additional sets of respiratory protection equipment for the cargoes stowed in the wheelhouse.

§ 154.1410 Decontamination shower.

When Table 4 references this section, a vessel carrying the referenced cargo must have a decontamination shower and an eye wash that are—

(a) On the weatherdeck; and

(b) Marked EMERGENCY SHOWER in letters—

(1) 7.6 cm (3 in.) high; and

(2) 5.1 cm (2 in.) wide.

§ 154.1415 Air compressor.

A vessel must have an air compressor to recharge the bottles for breathing apparatus.

§ 154.1420 Stretchers and equipment.

A vessel must have—

(a) Two stretchers or wire baskets; and

(b) Equipment for lifting an injured person from a cargo tank, hold, or void space.

§ 154.1425 Oxygen resuscitation.

A vessel must have an oxygen resuscitator.

§ 154.1430 Equipment locker.

One of each item listed in §§ 154.1400 and 154.1420 must be stowed in a marked locker—

(a) On the open deck in or adjacent to the cargo area; or

(b) In the accommodation house near to a door opening onto the main deck.

§ 154.1435 Medical first aid guide.

Each vessel must have a copy of the IMCO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods.

§ 154.1440 Antidotes.

A vessel must have the antidotes prescribed in the IMCO Medical First Aid

Guide for Use in Accidents Involving Dangerous Goods for the cargoes being carried.

§ 154.1445 Lifesaving devices.

The design of the lifeboats and liferafts must allow for launching at the final angle of heel from the lower side of the vessel.

Subpart D—Special Requirements

§ 154.1700 Materials of construction.

When Table 4 references one of the following paragraphs in this section, the materials in the referenced paragraph must not be used in components that contact the cargo liquid or vapor:

(a) Aluminum and aluminum bearing alloys.

(b) Copper and copper bearing alloys.

(c) Zinc or galvanized steel.

(d) Magnesium.

(e) Mercury.

(f) Acetylide forming materials, such as copper, silver, and mercury.

§ 154.1705 Independent tank type C.

The following cargoes must be carried in an independent tank type C that meets § 154.701(a)(2):

(a) Ethylene oxide.

(b) Methyl bromide.

(c) Sulphur dioxide.

§ 154.1710 Exclusion of air from cargo tank vapor spaces.

When a vessel is carrying acetaldehyde, butadiene, ethylene oxide, or vinyl chloride, air must be—

(a) Purged from the cargo tanks and associated piping before the cargo is loaded; and

(b) Excluded after the cargo is loaded by maintaining a positive pressure of at least 0.14 kp/cm² (2 psig) by—

(1) Introducing a gas that—

(i) Is not reactive;

(ii) Is not flammable; and

(iii) Does not contain more than 0.2 percent oxygen by volume; or

(2) Controlling the cargo temperature.

§ 154.1715 Moisture control.

When a vessel is carrying sulphur dioxide, the master shall ensure that—

(a) A cargo tank is dry before it is loaded with sulphur dioxide; and

(b) Air or inert gas admitted into a tank carrying sulphur dioxide during discharging or tank breathing has a moisture content equal to or less than the moisture content of air with a dewpoint of −45° C (−49° F) at atmospheric pressure.

§ 154.1720 Indirect refrigeration.

A refrigeration system that is used to cool acetaldehyde, ethylene oxide, or methyl bromide, must be an indirect refrigeration system that does not use vapor compression.

§ 154.1725 Ethylene oxide.

(a) A vessel carrying ethylene oxide must—

(1) Have cargo piping, vent piping, and refrigeration equipment that have no connections to other systems;

(2) Have valves, flanges, fittings, and accessory equipment made of steel, stainless steel, except types 416 and 442, or other material specially approved by the Commandant (G-MHM);

(3) Have valve disk faces, and other wearing parts of valves made of stainless steel containing not less than 11 percent chromium;

(4) Have gaskets constructed of spirally wound stainless steel with teflon or other material specially approved by the Commandant (G-MHM);

(5) Not have asbestos, rubber, or cast iron components in the cargo containment system and piping; and

(6) Not have threaded joints in cargo piping.

(b) Cargo hose used for ethylene oxide must—

(1) Be specially approved by the Commandant (G-MMT); and

(2) Be marked "For (Alkylene or Ethylene) Oxide Transfer Only."

(c) Ethylene oxide must be maintained at less than 30° C (88° F).

(d) Cargo tank relief valves for tanks containing ethylene oxide must be set at 5.5 kp/cm² (78.2 psig) or higher.

(e) A vessel must have a method specially approved by the Commandant (G-MHM) of jettisoning ethylene oxide.

§ 154.1730 Ethylene oxide: Loading and off loading.

(a) The master shall ensure that before ethylene oxide is loaded into a tank—

(1) The tank is thoroughly clean, dry, and free of rust; and

(2) The tank vapor spaces and hold spaces are inerted with an inert gas that meets § 154.1710(b)(1).

(b) Ethylene oxide must be off loaded by a deepwell pump or inert gas displacement.

(c) Ethylene oxide must not be carried in deck tanks.

§ 154.1735 Methyl acetylene-propadiene mixture.

(a) The composition of the methyl acetylene-propadiene mixture at loading must be within the following limits:

(1) Maximum methyl acetylene and propadiene molar ratio of 3 to 1.

(2) Maximum combined concentration of methyl acetylene and propadiene of 65 mole percent.

(3) Minimum combined concentration of propane, butane, and isobutane is 24 mole percent, of which at least one third must be butanes and one third propane.

(4) Maximum propylene concentration of 10 mole percent.

(5) Maximum butadiene concentration of 2 mole percent.

(b) A vessel carrying a methyl acetylene-propadiene mixture must have a refrigeration system that does not use vapor compression or a refrigeration system that has the following features:

(1) Uses vapor compression so that the temperature to which the vapor may be subjected is 60° C (140° F) or less and the pressure is 17.6 kp/cm² (250 psig) or less.

(2) Discharge piping that has—

(i) Two temperature actuated shutdown switches set to operate at 60° C (140° F) or less;

(ii) A pressure actuated shutdown switch set to operate at 17.6 kp/cm² (250 psig) or less; and

(iii) A safety relief valve set to relieve at 18.0 kp/cm² (256 psig) or less.

(3) A relief valve that vents to a mast that meets § 154.805 and does not relieve into the compressor suction line.

(4) An alarm that sounds in the cargo control station and in the wheelhouse when the high pressure switch, high temperature switch, or relief valve operates.

(c) A vessel carrying a methyl acetylene-propadiene mixture must have cargo piping, vent piping, and refrigeration equipment that have no connections to other systems.

§ 154.1740 Vinyl chloride: Inhibiting and inerting.

When a vessel is carrying vinyl chloride, the master shall ensure that—

(a) Vinyl chloride is inhibited under the requirements of § 154.1818; or

(b) The requirements in § 154.1710 are met, and the oxygen content of inert gas is less than 0.1 percent by volume.

§ 154.1745 Vinyl chloride: Transferring operations.

A vessel carrying vinyl chloride must meet the requirements under § 40.15-1 of this chapter.

§ 154.1750 Butadiene or vinyl chloride: Refrigeration system.

A refrigeration system for butadiene or vinyl chloride must not use vapor compression unless it—

(a) Avoids any stagnation points where uninhibited liquid can accumulate; or

(b) Has inhibited liquid from the tank added to the vapor upstream of the condenser.

§ 154.1755 Nitrogen.

Cargo containment systems other than deck tanks on vessels carrying nitrogen must be specially approved by the Commandant (G-MMT).

Subpart E—Operations

§ 154.1800 Special operating requirements under Part 35 of this chapter.

A vessel must meet the requirements of Part 35 of this chapter.

§ 154.1802 Certificates, letters, and endorsements required.

(a) No person may operate a U.S. flag vessel unless the vessel's Certificate of Inspection issued under Subchapter D of this chapter is endorsed with the name of the cargo that it is allowed to carry.

(b) No person may operate a foreign flag vessel on the navigable waters of the United States unless the vessel has—

(1) A Certificate of Fitness for Carriage of Liquefied Gases in Bulk issued by the country of registry and a Letter of Compliance issued by the Commandant (G-MHM) endorsed under this part with the name of the cargo that it is allowed to carry; or

(2) A Letter of Compliance issued by the Commandant (G-MHM) endorsed with the name of the cargo that it is allowed to carry.

(3) The following plans and information are carried aboard:

(i) A description and schematic plan of the arrangement for inerting cargo tanks, hold spaces, and interbarrier spaces.

(ii) A description of the tank gauging equipment.

(iii) A description and instruction manual for the calibration of the cargo leak detector equipment.

(iv) A schematic plan that shows the locations of leak detectors and sampling points.

(v) A description of the systems for cargo temperature and pressure control for methane to meet proposed §§ 154.701 through 154.709.

§ 154.1804 Document posted in wheelhouse.

No person may operate a vessel unless the endorsed document required under § 154.1802 is under glass in the wheelhouse.

§ 154.1806 Copy of this subchapter on board.

No person may operate a U.S. flag vessel unless a copy of this part and a copy of Part 35 of this chapter are on board.

§ 154.1808 Limitations in the endorsement.

No person may operate a vessel unless that person complies with all limitations in the endorsement on the vessel's Certificate of Inspection or Letter of Compliance.

§ 154.1809 Loading and stability manual.

(a) No person may operate a vessel unless the vessel has on board a loading and stability manual.

(b) The loading and stability manual must contain—

(1) Information that enables the master to load and ballast the vessel while keeping structural stresses within design limits and positive metacentric height;

(2) Damage stability information, including all loading restrictions; and

(3) Trim information.

§ 154.1810 Cargo manual.

(a) No person may operate a vessel unless the vessel has on board a cargo manual.

(b) The cargo manual must contain the following information:

(1) A description of each cargo and its handling hazards as a liquid and as a gas, including accidents involving frostbite and asphyxiation, safety equipment, and first aid measures.

(2) A description of the dangers of asphyxiation from the inerting gases used on the vessel.

(3) The measures necessary to mitigate embrittlement of steel structure in way of cargo leakage.

(4) The use of the firefighting systems on the vessel.

(5) The features of the cargo containment system that affect operation and maintenance, including pressure and temperature ranges and relief valve setting.

(6) Pressures, temperatures, and liquid levels for all operations.

(7) General information derived from the first loading of the vessel.

(8) All alarm settings.

(9) A description of the components of the cargo system, including the following:

(i) Liquid cargo system.

(ii) Liquid recirculating or condensate return system.

(iii) Cargo tank cool-down system.

(iv) Cargo tank warm-up or vaporization system.

(v) Gas main system.

(vi) Cargo tank or compressor relief system and blocked liquid or gas relief system.

(vii) Inerting system.

(viii) Boil-off gas compressor or reliquefaction system.

(ix) Vapor leak detection systems.

(x) Alarm or safety indication systems.

(xi) Cargo jettisoning system.

(xii) Gas or fuel to engine room system.

(10) A description of cargo loading and discharge operations, including simultaneous handling of multigrades of cargo and ballast.

(11) A description of cargo operations during the voyage.

(12) A description of cargo tank cool-down and warm-up operations including purging and gasfreeing.

(13) A description of hull and cargo tank temperature monitoring systems.

(14) A description of vapor leak detection and alarm or safety systems.

(15) A description of the following conditions and their symptoms, including emergency measures and corrective actions:

(i) Cargo or ballast valve malfunction.

(ii) Low cargo tank gas pressure.

(iii) High fill level shutdown.

(iv) Gas compressor shutdown.

(v) Hull cold spots.

(vi) Cargo piping leaks.

(vii) Primary or secondary barrier failure.

(viii) Hold boundary structural failure.

(ix) Fire in vent mast head.

(x) Reliquefaction plant failure.

(xi) Vaporizer malfunction or failure.

(xii) Piping or cargo valve freeze-up.

(16) Any other matters relating to operation of the cargo systems.

(17) Operational means necessary to maintain the vessel in a condition of positive stability through all conditions of—

(i) loading and deballasting; and

(ii) unloading and ballasting.

(c) The master shall ensure that the cargo manual is kept up-to-date.

§ 154.1812 Operational limitation information.

The master shall ensure that terminal personnel are told the operational limitation information required by § 154.1810 (b) (17).

§ 154.1814 Cargo information cards.

(a) No person may operate a vessel unless a cargo information card for each cargo being transported is carried either in the wheelhouse, in the ship's office, or in another location easily accessible to the person in charge of the watch.

(b) When a vessel is moored at a terminal, the master shall ensure that a set of information cards is in the possession of the terminal's person in charge of cargo transfer operations.

(c) Each card must be at least 17 cm x 24 cm (7 in. x 9½ in.), have printing on one side only, and must contain the following information about the cargo:

(1) Name as listed in Table 4.

(2) Appearance.

(3) Odor.

(4) The hazards involved in handling procedures for safe handling, including any special handling instructions.

(5) Procedures to follow in the event of spills, leaks, equipment breakdown, or uncontrolled cargo release.

(6) Procedures to be followed if a person is exposed to the cargo.

(7) Firefighting procedures and media.

§ 154.1816 Cargo location plan.

The master shall ensure that—

(a) A cargo location plan is prepared that gives—

(1) The location and number of each cargo tank; and

(2) The name of the cargo in each tank;

(b) One cargo location plan is kept with the sets of cargo information cards required under § 154.1814; and

(c) The cargo names in the cargo location plan do not differ from the names of the cargoes listed in Table 4.

§ 154.1818 Certificate of inhibition.

(a) Except as provided in § 154.1740 (b), no person may operate a vessel carrying butadiene or vinyl chloride without carrying in the wheelhouse written certification from the shipper that the product is inhibited.

(b) The certification required by this section must contain the following information:

(1) The name and concentration of the inhibitor.

(2) The date the inhibitor was added.

(3) The expected duration of the inhibitor's effectiveness.

(4) Any temperature limitations qualifying the inhibitor's effective lifetime.

(5) The action to be taken if the time of the voyage exceeds the inhibitor's lifetime.

§ 154.1820 Shipping document.

No person may operate a vessel without carrying a shipping document in the wheelhouse that lists for each cargo on board—

(a) The tank in which the cargo is stowed;

(b) The name of the shipper;

(c) The location of the loading terminal;

(d) The cargo name as listed in Table 4; and

(e) The approximate quantity of the cargo.

§ 154.1822 Shipping document: Copy furnished the transfer terminal.

While a vessel is moored at a transfer terminal, the master shall ensure that at least one copy of the shipping document is given to the terminal's person in charge of cargo transfer.

§ 154.1824 Obstruction of pumproom ladderways.

The master shall ensure that each cargo pumproom access is unobstructed.

§ 154.1826 Opening of tanks and cargo sampling.

(a) The master shall ensure that each tank opening is fully closed at all times.

(b) The master may authorize the opening of a tank—

(1) During tank cleaning; and

(2) To sample a cargo that Table 4 allows to be carried in a containment system having a restricted gauging system if—

(i) The tank is not being filled during sampling;

(ii) The vent system has relieved any pressure in the tank; and

(iii) The person sampling the cargo wears the protective clothing required under § 154.1840.

(c) The master shall ensure that cargoes requiring closed gauging as listed in Table 4 are sampled only through the controlled sampling arrangement of the tank.

§ 154.1828 Spaces containing cargo vapor: Entry.

(a) No person may enter a cargo handling space without the permission of the master.

(b) Before allowing anyone to enter a cargo handling space, the master shall ensure that—

(1) The space is free of toxic vapors and has enough oxygen to support life; or

(2) Those entering the space wear protective equipment with breathing apparatus and an officer closely supervises the entire operation.

§ 154.1830 Warning sign.

(a) The master shall ensure that a vessel transferring cargo while fast to a dock or while at anchor in port, displays a warning sign—

(1) At the gangway facing the shore so that the sign may be seen from the shore; and

(2) Facing outboard towards the water so that the sign may be seen from the water.

(b) Except as provided in paragraph (f) of this section, each warning sign must have the following legends:

(1) Warning.

(2) Dangerous Cargo.

(3) No Visitors.

(4) No Smoking.

(5) No Open Lights.

(c) Each letter on the sign must—

(1) Be block style;

(2) Be black on a white background;

(3) Be 7.6 cm (3 in.) high;

(4) Be 5.1 cm (2 in.) wide, except for "M" and "W" which must be 7.6 cm (3 in.) wide, and the letter "I" which may be 1.3 cm (½ in.) wide; and

(5) Have 1.3 cm (½ in.) stroke width.

(d) The spacing between letters must be—

(1) 1.3 cm (½ in.) between letters on the sign of the same word;

(2) 5.1 cm (2 in.) between words;

(3) 5.1 cm (2 in.) between lines; and

(4) 5.1 cm (2 in.) at the borders of the sign.

(e) The legends "No Smoking" and "No Open Lights" are not required when the cargoes on board a vessel are not flammable.

§ 154.1832 Incompatible cargo.

(a) The person in charge of cargo transfer may not authorize the loading of incompatible [1] cargoes into cargo containment systems unless the cargo containment systems are separated by—

(1) Cofferdams, other than the spaces between primary and secondary barriers;

(2) Empty tanks;

(3) Tanks containing mutually compatible cargo; or

(4) Piping tunnels.

(b) The person in charge of cargo transfer may not authorize loading of incompatible [1] cargoes into cargo containment systems that have common piping or venting systems.

(c) The person in charge of cargo transfer may not authorize loading of a cargo that is incompatible [1] with residue left in a tank from a previous cargo.

§ 154.1834 Cargo transfer piping.

The person in charge of cargo transfer shall ensure that cargo is transferred to or from a tank only through the cargo piping system.

§ 154.1836 Venting.

The person in charge of cargo transfer shall ensure that no cargo vapor is vented into the atmosphere.

§ 154.1838 Discharge by gas pressurization.

The person in charge of cargo transfer may not authorize cargo discharge by gas pressurization unless—

(a) The tank to be offloaded is an independent tank type B or C;

(b) The pressurizing medium is either the cargo vapor or a nonflammable, nontoxic gas that is inert with the cargo; and

(c) The pressurizing line has—

(1) A pressure reducing valve that has a setting that is 90 percent or less of the tank's MARVS; and

(2) A manual control valve between the pressure reducing valve and the tank.

[1] Incompatible cargoes are listed in Navigation and Vessel Inspection Circular 4-75 and is available from the Commandant (G-MHM-3/83) U.S. Coast Guard, Washington, D.C. 20590.

§ 154.1840 Protective clothing.

The person in charge of cargo transfer shall ensure that every person involved in cargo transfer wears the protective clothing, boots, gloves, and goggles required under § 154.1400.

§ 154.1842 Cargo systems controls and alarms.

The master shall ensure that each cargo emergency shutdown and alarm system used in cargo transfer is tested before cargo transfer begins.

§ 154.1844 Cargo tanks: Filling limits.

(a) The master shall ensure that a cargo tank is not loaded—

(1) More than 98 percent full; or

(2) In excess of the volume determined under the following formula, unless a higher limit is specified on the Certificate:

$$V_L = 0.98\,V\,\frac{d_r}{d_L}$$

where:

V_L = Maximum volume to which the tank may be loaded.

V = Volume of the tank.

d_r = Density at the reference temperature specified in (b).

d_L = Density of the cargo at the loading temperature and pressure.

(b) The reference temperature to be used in paragraph (a) of this section is the temperature corresponding to the vapor pressure of the cargo at the set pressure of the pressure relief valves.

§ 154.1846 Relief valves: Changing set pressure.

The master shall—

(a) Supervise the changing of the set pressure of relief valves under the requirements of § 154.802(b);

(b) Enter the change of set pressure in the vessel's log; and

(c) Ensure that a sign showing the set pressure is posted—

(1) In the cargo control room or station; and

(2) At each relief valve.

§ 154.1848 Inerting.

(a) A master shall ensure that—

(1) Hold and interbarrier spaces on vessels with full secondary barriers are inerted when flammable cargoes are carried;

(2) Hold and interbarrier spaces are maintained full of dry air or inerted gas on—

(i) Vessels with partial secondary barriers;

(ii) Vessels with full secondary barriers when non-flammable cargoes are carried; and

(iii) Vessels with refrigerated independent tanks type C;

(3) When tanks containing flammable vapor are to be gas freed, the flammable vapors are purged from the tank by inert gas before air is admitted; and

(4) When gas free tanks are to be filled with a flammable cargo, air is purged from the tank by inert gas before cargo liquid or vapor is introduced.

(b) Inert gas must be supplied from the shore or from the vessel's inert gas system.

§ 154.1850 Entering cargo handling spaces.

(a) The master shall ensure that the ventilation system required under § 154.-1205 is in operation for 30 minutes before a person enters one of the following:

(1) Spaces containing cargo pumps, compressors, and compressor motors.

(2) Gas dangerous cargo control spaces.

(3) Other spaces containing cargo handling equipment.

(b) The master shall ensure that a warning sign is posted outside of each space listed in paragraph (a) of this section which sets out the requirement for use of the ventilation system.

(c) The master shall ensure that no sources of ignition are put in a cargo handling space on a vessel carrying flammable cargo unless the space is gas free.

§ 154.1852 Air breathing equipment.

(a) The master shall ensure that a licensed officer inspects the compressed air breathing equipment at least once each month.

(b) The master shall enter in the vessel's log a record of the inspection required under paragraph (a) of this section that includes—

(1) The date of the inspection; and

(2) The condition of the equipment at the time of the inspection.

§ 154.1854 Methane (LNG) as fuel.

(a) If methane (LNG) vapors are used as fuel in the main propulsion system of a vessel, the master shall ensure that the pilot fuel oil burner required under § 154.703(c)(7) is used when the vessel is on the navigable waters of the United States.

(b) When the methane (LNG) fuel supply is shut down due to loss of ventilation or detection of gas, the master shall ensure that the methane (LNG) fuel supply is not used until the leak or other cause of the shutdown is found and corrected.

(c) The master shall ensure that the requirements in paragraph (b) of this section are posed in the main machinery space.

§ 154.1856 Correction of cold spots in the hull.

No person may operate a vessel unless cold spots in the hull are corrected under the requirements of § 154.122.

§ 154.1858 Cargo hose used in prototype testing.

The master shall ensure that a cargo hose used in prototype testing is not used for cargo transfer service.

§ 154.1860 Integral tanks: Cargo colder than −10°C(14°F).

The master shall ensure that no integral tank is used to carry a cargo colder than −10° C (14° F) unless specially approved by the Commandant (G-MMT).

§ 154.1862 Posting of speed reduction.

If a speed reduction is specially approved by the Commandant under § 154.-409, the master shall ensure that the speed reduction is posted in the wheelhouse.

§ 154.1864 Vessel speed within speed reduction.

The master shall ensure that the speed of the vessel is not greater than the posted speed reduction.

§ 154.1866 Car[go] Transferring

No person may [operate] a cargo hose con[nected] unless the connection has a re[mote] closing shut-off

§ 154.1868 Por[t] personnel access o[pening]

The master sh[all ensure] ble blower in a p[osition] does not reduce [the] so that it does n[ot]

§ 154.1870 Bo[w]

(a) The maste[r] off valves require[d] when the bow o[r] not in use.

(b) The pers[on] transfer shall en[sure] or stern loadin[g] purged of cargo

(c) The pers[on] transfer shall [be] forced or natural[ly] hausts, and othe[r] house alongside [the] piping are closed [and] use.

(d) The pers[on] transfer shall en[sure] loading piping [in] the accommoda[tion] space is not use[d]

(1) Acetaldeh[yde]

(2) Ammonia,

(3) Dimethyla[mine]

(4) Ethylamin[e]

(5) Methyl Ch[loride]

(6) Vinyl Chl[oride]

TABLE 4.—*Summary of minimum requirements*

Cargo name	Ship type	Independent tank type C required	Control of cargo tank vapor space	Vapor detection	Gaging	Electrical hazard group and class	Special req
Acetaldehyde	IIG/IIPG		Inert	I. & T.	C	I-C	154.1400(c), 154.1410; 154.1710; 15
Ammonia, anhydrous	IIG/IIPG			T	C	I-D	154.1000, 154.1400(c); 154.1405, 15
Butadiene	IIG/IIPG		Inert	I	R	I-B	154.1700(b)(d)(f), 154.1710; 154.17
Butane	IIG/IIPG			I	R	I-D	None.
Butylene	IIG/IIPG			I	R	I-D	Do.
Dimethylamine	IIG/IIPG			I. & T.	C	I-C	154.1400(c), 154.1405; 154.1410, 154
Ethane	IIG			I	R	I-D	None.
Ethylamine	IIG/IIPG			I. & T.	C	I-C	154.1400(c), 154.1405; 154.1410, 154
Ethyl chloride	IIG/IIPG			I. & T.	R	I-D	154.1870.
Ethylene	IIG			I	R	I-C	None.
Ethylene oxide	IG	Yes	Inert	I. & T.	C	I-B	154.1400(c), 154.1405; 154.1410, 1 154.1720, 154.1725; 154.1730, 154.1
Methane (LNG)	IIG			I	C	I-D	154.703–709; 154.1854.
Methyl acetylene propadiene mix.	IIG/IIPG			I	R	I-	154.1735.
Methyl bromide	IG	Yes		I. & T.	C	I-D	154.660(c)(2), 154.1345(c)(d), 154. (g), 154.1705; 154.1720, 154.1870.
Methyl chloride	IIG/IIPG			I. & T.	C	I-D	154.1700(a), 154.1870.
Nitrogen	IIG			O	C		154.1755.
Propane	IIG/IIPG			I	R	I-D	None.
Propylene	IIG/IIPG			I	R	I-D	Do.
Refrigerant gases [1]	IIG				R		Do.
Sulfur dioxide	IG	Yes	Dry	T	C		154.660(c)(2), 154.1345(c)(d), 154. 154.1715; 154.1720, 154.1870.
Vinyl chloride	IIG/IIPG			I. & T.	C	I-D	154.1405, 154.1410; 154.1790(a), 1 154.1745; 154.1750, 154.1818, 15

[1] Regrigerant gases include nontoxic, nonflammable gases, such as: dichlorodifluoromethane, dichloromonofluoromethane dichlorotetr methane, monochlorotetrafluoroethane, monochlorotrifluoromethane.

APPENDIX A—EQUIVALENT STRESS

The Coast Guard only accepts equivalent stress (σ_e) calculated under the following or a formula specially approved by the Commandant (G-MMT) as equivalent to the following:

I.

$$\sigma_e = \sqrt{\sigma_x^2 + \sigma_y^2 - \sigma_x\sigma_y + 3\tau_{xy}^2}$$

where:

σ_x = Total normal stress in "x" direction.

σ_y = Total normal stress in "y" direction.

τ_{xy} = Total shear stress in "xy" plane.

II. When the static and dynamic stresses are calculated separately, the total stresses in *paragraph I are calculated from the following* or equivalent formulae specially approved by the Commandant (G-MMT):

$$\sigma_x = \sigma_x(\text{static}) \pm \sqrt{\sum(\sigma_x(\text{dynamic}))^2}$$

$$\sigma_y = \sigma_y(\text{static}) \pm \sqrt{\sum(\sigma_y(\text{dynamic}))^2}$$

$$\tau_{xy} = \tau_{xy}(\text{static}) \pm \sqrt{\sum(\tau_{xy}(\text{dynamic}))^2}$$

III. Each dynamic and static stress is determined from its acceleration component and its hull strain component from hull deflection and torsion.

APPENDIX B—STRESS ANALYSES DEFINITIONS

The following are the standard definitions of stresses for the analysis of independent tank type B:

I. "Normal stress" means the component of stress normal to the plane of reference.

II. "Membrane stress" means the component of normal stress that is uniformly distributed and equal to the average value of the stress across the thickness of the section under consideration.

III. "Bending stress" means the variable stress across the thickness of the section under consideration, after the subtraction of the membrane stress.

IV. "Shear stress" means the component of the stress acting in the plane of reference.

V. "Primary stress" means the stress produced by the imposed loading that is necessary to balance the external forces and moments. (The basic characteristic of a primary stress is that it is not self-limiting. Primary stresses that considerably exceed the yield strength results in failure or at least in gross deformations.)

VI. "Primary general membrane stress" means the primary membrane stress that is so distributed in the structure that no redistribution of load occurs as a result of yielding.

VII. "Primary local membrane stress" means the resulting stress from both a membrane stress, caused by pressure or other mechanical loading, and a primary or a discontinuity effect that produces excessive distortion in the transfer of loads to other portions of the structure. (The resulting stress is defined as a primary local membrane stress although it has some characteristics of a secondary stress. A stress region is local if—

$$S_1 \leq .05\sqrt{Rt};$$

and

$$S_2 \leq 2.5\sqrt{Rt}$$

Where:

S_1 = distance in the meridional direction over which the equivalent stress exceeds 1.1 f.

S_2 = distance in the meridional direction to another region where the limits for primary general membrane stress are exceeded.

R = means radius of the vessel.

t = wall thickness of the vessel at the location where the primary general membrane stress limit is exceeded.

f = allowable primary general membrane stress.

VIII. "Secondary stress" means a normal stress or shear stress caused by constraints of adjacent parts or by self-constraint of a structure. (The basic characteristic of a secondary stress is that it is self-limiting. Local yielding and minor distortions can satisfy the conditions that cause the stress to occur.)

(R.S. 4472, as amended (46 U.S.C. 170); sec. 201, 86 Stat. 427, as amended (46 U.S.C. 391a); sec. 6(b)(1), 80 Stat. 937 (49 U.S.C. 1655(b)(1)); 49 CFR 1.46 (b), (t), (n)(4).)

Dated: September 25, 1976.

W. M. BENKERT,
Rear Admiral, U.S. Coast Guard, Chief, Office of Merchant Marine Safety.

[FR Doc.76-28693 Filed 10-1-76;8:45 am]

APPENDIX VIII - AIR COMPRESSORS; CARGO HANDLING ROOM BILGES ON TANK VESSELS (40 FR 33996)

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
U.S. COAST GUARD (G-CMC/82)
400 SEVENTH STREET SW
WASHINGTON, D.C. 20590
PHONE 202 426 1477

proposed rules

5991/2
18 August 1975
Serial 12-P-75

Interested persons are invited to participate in this rulemaking by submitting written data, views, or arguments to the Executive Secretary, Marine Safety Council, U.S. Coast Guard (G-CMC/82), Washington D.C. 20590, prior to September 29, 1975.

DEPARTMENT OF TRANSPORTATION

Coast Guard

[46 CFR Parts 32, 35]

[CGD 75-017]

AIR COMPRESSORS; CARGO HANDLING ROOM BILGES ON TANK VESSELS

Proposed Requirements

The Coast Guard is considering amending the regulations for tank vessels to—

(a) prohibit the accumulation of cargo in cargo handling room bilges;

(b) prohibit installation of an air compressor in cargo handling rooms and other cargo areas on a new tank vessel;

(c) prohibit use of an air compressor *in a cargo area on an existing vessel* and require that it be made permanently inoperative or removed from the cargo area at the next drydocking or inspection for certification of the vessel, whichever occurs first.

Interested persons may participate in this proposed rule making by submitting written data, views, or arguments to the Coast Guard (G-CMC), 400 Seventh Street, S.W., Washington, D.C. 20590. Each person submitting comments should include his name and address, identify the notice (CGD 75-017) and give reasons for any recommendations. Comments received before September 29, 1975, will be considered before final action is taken on this proposal. Copies of all written comments will be available for examination by interested persons in room 8234, Department of Transportation, Nassif Building, 400 Seventh Street, SW., Washington, D.C. The proposal may be changed in light of the comments received. No hearing is contemplated but may be held at a time and place set in a later notice in the Federal Register if requested by an interested person desiring an opportunity to comment orally at a public hearing and raising a genuine issue.

The amendments in this notice are proposed in accordance with the Commandant's Action on the Marine Board of Investigation of the SS TEXACO NORTH DAKOTA. The Commandant's Action concluded that cargo that leaks or is drained or spilled into a pump room bilge poses a hazard to the vessel and its personnel and make the operation of an air compressor in the pump room hazardous. It has been determined further that cargo that leaks or is drained or spilled into a bilge of any cargo handling room poses a hazard and that operation of an air compressor in or adjacent to any cargo area on a tank vessel likewise poses a hazard.

In consideration of the foregoing, it is proposed to amend Chapter I of Title 46 of the Code of Federal Regulations as follows:

1. By adding a new § 32.35-15 to read as follows:

§ 32.35-15 Installation of air compressors on tank vessels contracted for on or after [the effective date of these regulations]—TB/ALL.

No tank vessel contracted for on or after [the effective date of these regulations] may have an air compressor or an air compressor intake installed in any of the following cargo areas:

(a) A Cargo handling room.

(b) An enclosed space containing cargo piping.

(c) A space in which cargo hose is stowed.

(d) A space adjacent to a cargo tank or cargo tank hold.

(e) A space within three meters of any of the following:

(1) A cargo tank opening.

(2) An outlet for cargo gas or vapor.

(3) A cargo pipe flange.

(4) A cargo valve.

(5) An entrance or ventilation opening to a cargo handling room.

(f) The space on the open deck that is 2.4 meters high and that has a deck area bounded by the following:

(1) The port and starboard edges of the open deck.

(2) A straight line that—(i) Connects the port and starboard edges of the open deck;

(ii) Is three meters forward of the cargo tank or cargo tank hold closest to the bow; and

(iii) Is perpendicular to the centerline of the vessel.

(3) A straight line that—(i) Connects the port and starboard edges of the open deck;

(ii) Is three meters aft of the cargo tank or cargo tank hold closest to the stern; and

(iii) Is perpendicular to the centerline of the vessel.

(g) An enclosed space having an opening into a location described in paragraphs (a)-(f) of this section.

(h) A location similar to those described in paragraphs (a)-(g) of this section in which cargo vapors or gases may be present.

2. By adding a new § 35.35-80 to read as follows:

§ 35.35-80 Tank dregs and slops TB/ALL.

(a) No person may drain or authorize the drainage of cargo from a pump, piping system, or tank into a cargo handling room bilge except during repairs or maintenance of cargo handling equipment.

(b) The master or person in charge of a vessel shall ensure that cargo that accumulates in a bilge of a cargo handling room is promptly removed from the bilge.

3. By adding a new § 35.35-85 to read as follows:

§ 35.35-85 Air compressors TB/ALL.

(a) No person may operate an air compressor in a cargo area described in in § 32.35-15 of this subchapter.

(b) The owner of a vessel that has an air compressor or an air compressor intake in a cargo area described in § 32.35-

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C: o(6),g(3),dkln(1)
E: ao(4)
F: k(25),b(5),cmp(1)
List CG-10
CG-26

15 of this subchapter must have the equipment made permanently inoperative or removed from that location at the next drydocking or inspection for certification of the vessel after [the effective date of these regulations], whichever occurs first. The equipment may not be reinstalled thereafter in a cargo area described in § 32.35-15 of this subchapter.

(R.S. 4405, as amended, (46 U.S.C. 375); R.S. 4417a, as amended, (46 U.S.C. 391a); R.S. 4462, as amended, (46 U.S.C. 416); Sec. 1, Pub. L. 86-244, 73 Stat. 475 (46 U.S.C. 481 (a)); Sec. 6(b)(1), 80 Stat. 938 (49 U.S.C. 1655(b)); 49 CFR 1.46(b) and (0)(4))

Dated: August 8, 1975.

W. M. BENKERT,
Rear Admiral, U.S. Coast Guard,
Chief, Office of Merchant Marine Safety.

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APPENDIX IX - FOREIGN FLAG TANK VESSELS
(41 FR 37119)

[46 CFR Part 30]
[CGD 76-081]

FOREIGN FLAG TANK VESSELS

Shipping Papers

The Coast Guard is considering amending Part 30 of the tank vessel regulations to require all foreign flag tank vessels when loaded to have shipping papers on board while in United States waters.

Interested persons are invited to participate in this proposed rule making by submitting written data, views, or arguments to the Commandant (G-CMC/81), U.S. Coast Guard, Washington, D.C. 20590. Each person submitting a comment should include his name and address, identify the notice (CGD 76-081), and give reasons in support of his comment. Comments received before October 18, 1976, will be considered before final action is taken on this proposal. Copies of all written comments received will be available for examination by interested persons in Room 8117, Department of Transportation, Nassif Building, 400 Seventh Street SW, Washington, D.C. The proposal may be changed in light of the comments received.

No hearing is contemplated but one may be held at a time and place set in a later notice in the FEDERAL REGISTER if requested by an interested person desiring an opportunity to comment orally at a public hearing and raising a genuine issue.

Section 35.01-10 of Part 35 requires each loaded tank vessel to have on board a bill of lading, manifest, or shipping document that provides the name of the consignee and the location of the delivery point, the kind, grades, and approximate quantity of each kind and grade of cargo, and for whose account the cargo is being handled. However, certain foreign flag tank vessels are presently exempt from this requirement as explained in the applicability § 30.01-5 of Part 30.

A formal investigation into the explosion and fire on board the tank barge ATC 3000, O.N. 512289, which occurred on March 17, 1975, revealed that proper identification of the grade of cargo transferred to the barge from the SS AMOCO YORKTOWN (of Liberian registry) could have alerted the repair crew aboard the barge to the inherent dangers associated with carriage of the cargo. Information concerning the grade of cargo being transferred could have been obtained from the shipping papers. Consequently, the Coast Guard is proposing to amend § 30.01-5(e) to make the requirements in §35.01-10 concerning shipping papers applicable to all foreign flag tank vessels.

In consideration of the foregoing, it is proposed to amend Part 30 of Title 46, Code of Federal Regulations, by revising § 30.01-5(e) to read as follows:

§ 30.01-5 Application of Regulations—TB/ALL.

* * * * * *

(e) This Subchapter shall be applicable to all foreign flag vessels carrying combustible or flammable liquid cargo in bulk while in the navigable waters over which the United States has jurisdiction, except that:

(1) A vessel of a foreign nation signatory to the International Convention for Safety of Life at Sea, 1960, which has on board a current valid Safety Equipment Certificate, or a vessel of a foreign nation having inspection laws approximating those of the United States, together with reciprocal inspection arrangements with the United States and which has on board a current valid certificate of inspection issued by its government under such arrangements, in either case, shall be subject only to the requirements of § 35.01-1 and § 35.01-10 and the safety and cargo handling requirements in Subparts 35.30 and 35.35 of this Subchapter * * *.

(46 U.S.C. 391(a); 49 U.S.C. 1655(b); 49 CFR 1.49)

Dated: August 25, 1976.

W. M. BENKERT,
Rear Admiral, U.S. Coast Guard,
Chief, Office of Merchant Marine Safety.

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GPO 909-991