United States General Accounting Office

GAO

Report to Congressional Requesters

October 1991

COAST GUARD

Inspection Program Improvements Are Under Way to Help Detect Unsafe Tankers

GAO/RCED-92-23

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-245670

October 8, 1991

The Honorable Walter B. Jones
Chairman, Committee on Merchant Marine
and Fisheries
House of Representatives

The Honorable Robert W. Davis
Ranking Minority Member, Committee on
Merchant Marine and Fisheries
House of Representatives

The Honorable W. J. (Billy) Tauzin
Chairman, Subcommittee on Coast Guard
and Navigation
Committee on Merchant Marine and Fisheries
House of Representatives

The spill of more than 10 million gallons of crude oil into Alaska's Prince William Sound from the supertanker Exxon Valdez in 1989 increased emphasis on preventing spills from tankers and on the Coast Guard's program to inspect U.S. and foreign-flagged tankers operating in U.S. waters. The importance of these inspections has been further amplified by the dramatic aging of the world fleet.

This report responds to your request that we report on the effectiveness of the Coast Guard's inspection program for tankers carrying oil and other hazardous cargo. As agreed with your offices, we are providing information on (1) conditions and problems identified by the Coast Guard that are affecting its tanker inspection program and (2) actions being taken or considered by the Coast Guard to improve the inspection program.

Results in Brief

Coast Guard inspections have not always been reliable in detecting unsafe tankers. For tankers registered in the United States, such problems as too few inspectors, inexperienced inspectors, and limited inspection procedures have hampered the Coast Guard's inspection efforts. For foreign-flagged tankers, the Coast Guard relies heavily on inspections carried out under international agreements on behalf of the vessel's country of registration. However, these inspections have not always identified serious problems. Many reasons, including insufficient

training for inspectors and efforts to reduce costs, may have limited the effectiveness of these inspections.

The Coast Guard has begun to improve its inspection program. For example, program officials have started actions to increase the number of inspectors and have started a program to help ensure that older and other potentially unsafe vessels are inspected by experienced inspectors. It also has started an international dialogue, through a recent workshop, on actions needed to improve the inspection and safety of vessels worldwide.

During our review, we discussed with Coast Guard officials measures that could be taken to ensure the completeness and effectiveness of actions taken or planned by the Coast Guard. Specifically, we noted that the Coast Guard had not obtained information from industry on all major planned changes to the inspection program, developed a comprehensive plan for making major program changes, or developed procedures to review and evaluate the results of all major corrective actions taken. Coast Guard officials told us that they are considering developing a plan or strategy to implement program improvements and improve their ability to measure the success of the inspection program.

Background

The purpose of the Coast Guard's tanker inspection program is to minimize deaths, injuries, property loss, and environmental damage resulting from accidents or mishaps.[1] The program's activities include (1) developing federal standards and regulations for building and maintaining tankers, (2) working cooperatively with other nations to develop international agreements on marine safety, and (3) inspecting U.S. and foreign-flagged tankers that operate in U.S. waters.

The Coast Guard periodically inspects U.S. tankers to ensure that they comply with U.S. and international regulations. In general, tankers must undergo an initial inspection after construction and before being put into service. The Coast Guard's inspection process for U.S. tankers continues as long as the tankers remain in operation; it covers many components, including the boilers, propulsion system, steering, lifesaving equipment, electrical and mechanical system, and hull.

[1]The Coast Guard carries out tanker inspections as part of its Marine Inspection Program. Under that program, the Coast Guard inspects many types of vessels besides tankers, including passenger vessels, freighters, and barges.

The Coast Guard generally does not examine foreign tankers in as much detail as U.S. tankers and instead relies on certificates of compliance with international safety agreements issued by the country in which the tanker is registered. Coast Guard officials told us that a large majority of foreign tankers operating in U.S. waters are from countries that have adopted international Safety of Life at Sea (SOLAS) agreements on ship safety, which contain a wide variety of safety requirements for the construction and maintenance of tankers and other merchant vessels engaged in international voyages. Their certificates, according to Coast Guard officials, are usually based on inspections performed by classification societies rather than by the country itself.[2] If a foreign tanker is registered in a country not party to SOLAS, it is subject to detailed Coast Guard inspections similar to inspections done on U.S. tankers.

Coast Guard officials said that the Coast Guard's limited inspections of foreign tankers cover such matters as confirming that the lifesaving equipment, fire protection equipment, propulsion machinery, pollution prevention systems, navigation safety equipment, and main/emergency electrical equipment are being satisfactorily maintained in conformance with their inspection certificates. According to Coast Guard officials, recent data show that Coast Guard inspectors take, on average, 13 hours per year to inspect a foreign tanker, compared with over 80 hours to inspect a U.S. tanker.

Problems With Current Inspection Programs and Actions Taken to Detect Unsafe Tankers

Coast Guard officials are concerned about the safety of tankers operating in U.S. waters because of such factors as increasing age and poor maintenance. Generally, according to Coast Guard officials, the older a tanker is, the more likely it is to develop significant problems, such as deterioration of structural supports or breakdowns of key machinery or equipment, particularly when maintenance has been poor. Despite evidence showing that rates of marine accidents have generally diminished, serious safety-related problems have been found both on U.S. and on foreign-flagged tankers. Recent incidents have led marine safety experts to conclude that a small but unacceptable number of vessels are not safely maintained or operated and pose a significant risk of a future major oil spill. (See app. I for more information on the tanker fleet.)

[2]Many classification societies exist. Among the best known are the American Bureau of Shipping and Lloyd's Register of Shipping. Their inspections verify for underwriters that vessels are safely designed, constructed, and maintained and often verify for governments that ships registered under the country's flag are built and maintained in accordance with international agreements.

Coast Guard Inspections of U.S. Tankers

The Coast Guard's current inspection program cannot always be relied on to detect or correct unsafe conditions on U.S. tankers. Two recent Coast Guard studies completed after the Exxon Valdez oil spill—Report of the Tanker Safety Study Group (Oct. 6, 1989) and Trans-Alaska Pipeline Service (TAPS) Tanker Structural Failure Study (June 25, 1990)—identified wide-ranging problems affecting the Coast Guard's inspection program. These studies included many recommendations for improving tanker inspections. Coast Guard officials with whom we talked provided us with additional information on existing problems. Some of the more important problems are summarized below.

- Insufficient scrutiny for trans-Alaska pipeline service (TAPS) tankers: According to Coast Guard officials, a high structural failure rate of tankers in the TAPS trade showed that existing inspections were insufficient in scope and frequency to ensure vessel safety. The Coast Guard found that while the TAPS vessels comprised 13 percent of all U.S. vessels over 10,000 gross tons, they accounted for 59 percent of the structural failures reported to the Coast Guard between 1984 and 1988.
- Insufficient numbers of inspectors: The 1989 Coast Guard tanker safety report noted that inspector work loads averaged 65 to 70 hours per week at many ports. The study characterized the program as a "system in overload," with adverse effects on inspection quality. Coast Guard program officials with whom we talked agreed that the Coast Guard has too few inspectors for the existing workload.
- Lack of experienced inspectors: The 1990 Coast Guard report on TAPS tankers noted that personnel inspecting these tankers for shipping companies generally have 20 to 30 years of vessel inspection experience. By contrast, Coast Guard data show that about 70 percent of the Coast Guard's inspectors have fewer than 5 years of experience, including their 2 years of training. According to Coast Guard officials, one of the primary reasons for this situation is the frequent rotation of Coast Guard inspectors to other duties so that officers can gain experience in the Coast Guard's many missions. Coast Guard inspectors have been characterized, both by the Coast Guard and by vessel operators, as having too little experience to adequately inspect large tankers.
- Limited inspection procedures: Typical Coast Guard inspections leave major portions of large tankers uninspected because the upper parts of cargo or ballast tanks are not inspected. According to Coast Guard officials, costly scaffolding or other special means would have to be employed to provide access to these areas for close examination. Because of this limitation, fewer than 20 percent of the internal tank structures on the largest tankers may be inspected by the Coast Guard.

- Lack of flexibility to target resources: Coast Guard officials said that they are wasting limited resources because current procedures require them to conduct equally detailed inspections of all tankers, including those operated by companies with a strong commitment to safety and with programs in place to ensure safe operation. The officials told us that they would like to be able to devote more resources to "problem" vessels.

In response to its studies, the Coast Guard has taken and plans to take many actions to strengthen its tanker inspection procedures. For example, it began requiring operators of U.S. TAPS tankers in 1990 and of foreign TAPS tankers in 1991 to prepare inspection plans for areas on their tankers susceptible to cracking. The plans are to lay out a strategy for monitoring these areas and tracking the effectiveness of repairs.

Coast Guard program officials told us that they are currently determining the number of additional inspectors needed to eliminate the chronic shortage of inspectors. Also, to better ensure that high-risk tankers are inspected by experienced personnel, in 1990 the Coast Guard revived its "traveling inspector" program. Under this program, experienced inspectors from headquarters travel to field units to augment the inspection of vessels of concern, such as TAPS tankers or vessels over 20 years old. Also, to permit inspection of portions of tankers not normally accessible to inspectors, program officials told us that in 1991 they have begun to assess "tank rafting" techniques, whereby inspectors can inspect tanks from rafts inside the tanker by changing tank water levels.

Changes to increase the flexibility of inspections are also under consideration in an initiative called the Merchant Vessel Incentive Inspection Program. Under this initiative, U.S. tankers whose owners or operators meet specified criteria for good vessel management would not be inspected in as much detail as in the past. Criteria would include evidence from past inspections that the general condition of the tanker was outstanding. Potentially, this program could provide flexibility to target inspections to high-risk tankers.

Coast Guard Inspections of Foreign Tankers

Inspections of foreign tankers similarly cannot always be relied on to detect unsafe vessels. The classification society inspections, upon which the Coast Guard depends for assurance that foreign tankers meet international standards, are not always effective or reliable, according to agency officials. In addition, these officials told us, the Coast Guard's

limited inspection of foreign tankers has not provided sufficient assurance that the tankers are structurally sound. A Coast Guard investigation of a foreign tanker that almost sank off the coast of Washington State in 1990 showed that the vessel was unseaworthy, having, among other problems, holes rusted through the deck. This tanker had been examined shortly before the incident in separate inspections by a classification society and the Coast Guard.

This and other instances of inspections not identifying unsafe conditions contributed to expressions by the Coast Guard and others of strong concern about the international system in place for ensuring vessel safety. To look for ways to improve marine safety worldwide, the Coast Guard convened an international workshop in March 1991 for representatives of U.S. and foreign classification societies, vessel insurers, tanker owners, and officials from various countries. Workshop participants agreed that the current inspection programs and other procedures for ensuring marine safety do not adequately prevent or detect unsafe vessel conditions. They identified four possible causes of the problem:

- Inspectors working for classification societies or others may not act competently because they lack training or integrity.
- Owners or operators may change classification societies to avoid taking corrective actions, or may fail to report instances of nonconformance with standards.
- Classification societies may not all act uniformly, for many reasons, such as poor management, inadequate technical resources, economic pressures, and lack of quality assurance.
- Continual economic pressures may induce owners and others to reduce costs.

Coast Guard officials told us that the workshop was a very successful first step because, in part, it resulted in concerned parties' openly discussing how to deal with issues affecting marine safety and the inspection of foreign vessels under international agreements. They said that eventually revised international agreements will probably be needed, such as agreements on classification society standards.

The Coast Guard has also acted to improve its own inspection of foreign tankers. For example, in 1990 the Coast Guard strengthened its own procedures for assessing the structural fitness of foreign tankers. One new action requires inspectors to enter and examine at least one ballast tank annually for foreign tankers over 10 years old.

Additional Management Improvements Needed

Although improvements have been made to its tanker inspection program, the Coast Guard could further strengthen its inspection program management. For example, our review of the preliminary proposal for the Merchant Vessel Incentive Inspection Program did not show that shipping industry representatives, such as tanker owners or classification societies, would be consulted to obtain their timely advice and opinions on the proposed changes. Early and substantive involvement of such groups would, in our view, help to gain suggestions and support for proposed changes and would help the Coast Guard effectively implement these changes at a later date.

In addition, at the time of our review, the Coast Guard had developed neither a comprehensive written plan for implementing major changes to improve tanker inspections nor procedures for ensuring that appropriate actions are taken on the results of past studies. Such a plan and procedures are important not only because of the numbers and types of major changes being developed and considered but also because of the Coast Guard's frequent rotation of key inspection program personnel. A comprehensive written plan, updated as needed, and procedures for ensuring that appropriate actions are taken on the results of studies could help ensure the systematic evaluation and implementation of needed program changes.

Finally, at the time of our review, the Coast Guard had not yet developed methods to review and evaluate the effectiveness of all its major planned changes, such as the Merchant Vessel Incentive Inspection Program. Effective procedures for periodically reviewing the impact of actions taken can provide timely information on whether the actions are having the desired result.

During our review we discussed with Coast Guard officials additional actions needed to improve the inspection program. These officials generally agreed with us and said they were already considering developing an improved program plan that would show planned strategies for dealing with major problem areas and improve their ability to measure the success of the overall inspection program.

Conclusions

Given the aging of the tanker fleet, reduced maintenance levels, and the unreliability of current inspection programs, improvements in the inspection of domestic and foreign-flagged vessels are needed to ensure that tankers operating in U.S. waters are safe.

Because the Coast Guard has only recently implemented some changes in its tanker inspection program, it is too early to evaluate the effectiveness of actions taken thus far. However, until the Coast Guard strengthens its program management by involving industry in its planning process and developing strategies for planning, implementing, and evaluating changes, it will not be able to ensure the effectiveness of its corrective actions.

Recommendations

To ensure the effectiveness of actions taken to improve its tanker inspection programs, we recommend that the Secretary of Transportation direct the Commandant of the Coast Guard to (1) obtain timely input from industry on major program changes, such as the Merchant Vessel Incentive Inspection Program; (2) develop a comprehensive plan that describes major program changes and procedures for ensuring the implementation of appropriate recommendations from studies; and (3) develop procedures to review and evaluate the results of major actions taken.

Scope and Methodology

We conducted our audit work between September 1990 and August 1991. We interviewed personnel responsible for the vessel inspection program at Coast Guard headquarters in Washington, D.C., and at field offices in Seattle, Washington, and Portland, Oregon. We also reviewed requirements for the inspection program and evaluated pertinent reports. Additionally, we participated in inspections of several U.S. TAPS tankers and one foreign tanker. We performed our work in accordance with generally accepted government auditing standards.

We discussed the facts and our observations contained in this report with Coast Guard headquarters officials. The officials generally agreed with our findings. However, as requested, we did not obtain written agency comments on a draft of this report.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies of this report to the Secretary of Transportation, the Commandant of the Coast Guard, and other interested parties.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached at (202) 275-1000. Other major contributors to this report are listed in appendix II.

J. Dexter Peach
Assistant Comptroller General

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Figures

Abbreviations

GAO	General Accounting Office
SOLAS	Safety of Life at Sea
TAPS	Trans-Alaska Pipeline Service

Information on the Tanker Fleet

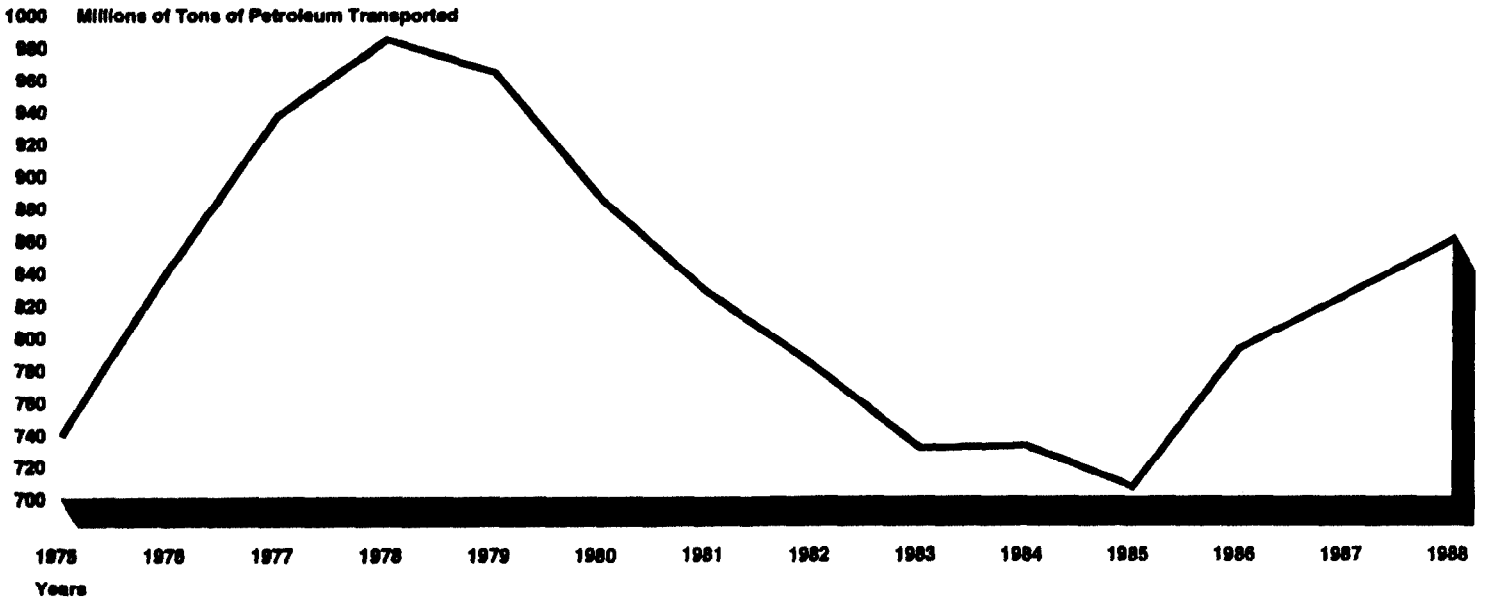
This appendix provides additional background information on the U.S. and world tanker fleets. Tankers are an important means of transporting petroleum and petroleum products. They are also, however, a significant source of oil pollution. The prevention of accidents or mishaps that can cause oil spills is a principal reason that the Coast Guard periodically inspects the condition of tankers. According to Coast Guard officials, a number of factors can contribute to unsafe vessel conditions, including the following:

- Increased age: As described later in this appendix, the world tanker fleet has aged dramatically. Generally, according to Coast Guard officials, the older a tanker is, the more likely it is to develop significant problems, such as deterioration of structural supports or breakdowns of key machinery or equipment. While age alone was not typically viewed by participants at the 1991 International Marine Safety Workshop as an important factor in vessels' not meeting international standards, it can play a crucial role when coupled with poor maintenance. Workshop participants noted that many older vessels are poorly maintained and pose a significant risk of causing a major oil spill or other marine disaster in the near future.
- Lower maintenance levels: Problems that can develop from vessel aging can often be prevented by good maintenance, according to Coast Guard officials. However, these officials stated that maintenance has decreased in recent years, in part because of depressed financial conditions in the shipping industry. Maintaining tankers can be expensive. For example, an oil industry representative told us that shipyard maintenance on large oil tankers over 10 years old typically costs between $3 million and $6 million during the 2-year drydocking cycle. He noted, however, that costs can run much higher under certain circumstances, such as when major steel overhaul work is needed.
- Use of high-tensile steel: Coast Guard officials told us that, as a cost-saving measure, vessels over the last 20 years often were built with high-tensile steel. They told us that this steel, also called high-strength steel, saves money because less of it is needed in construction, and the vessel's resulting lighter weight allows more cargo to be carried. However, a 1990 Coast Guard study on structural failures found that vessels built with high-tensile steel are more likely to develop cracks in their hulls or supporting beams.
- Bad weather: According to Coast Guard officials, severe weather conditions, such as those encountered by TAPS vessels in the Gulf of Alaska, can put stress on the hull and supporting structures and cause cracks to develop.

Amount of Oil Shipped by Vessel

More oil is shipped in U.S. waters than any other commodity. According to the U.S. Army Corps of Engineers' Waterborne Commerce of the United States, petroleum and petroleum products accounted for more than 40 percent of the cargo shipped to, from, or through the United States by water in 1988, more than twice as much as the next most common cargo. As figure I.1 shows, the amount of oil shipped by water in 1988 is roughly the same as was shipped in 1976—nearly 860 million tons.

Figure I.1: Amount of Petroleum Transported by Water in U.S. Domestic and International Trade



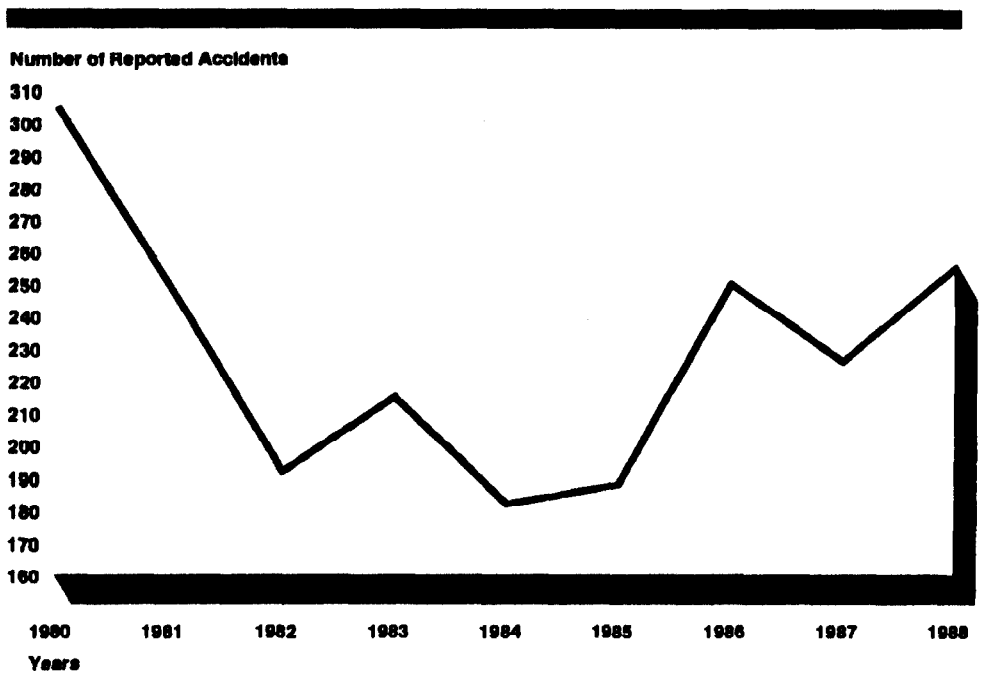
Source: GAO Analysis of U.S. Army Corps of Engineers Data.

Tanker Casualty and Pollution Rates

There are indications that the number of tanker accidents is decreasing. The Coast Guard investigates reports of tanker accidents and annually reports its findings. In fiscal year 1988, the Coast Guard received reports of 255 accidents involving U.S. tankers, down from 305 accidents reported in 1980. Figure I.2 shows the number of U.S. tanker casualties reported between 1980 and 1988. In addition, a 1990 study by the National Research Council on crew size and maritime safety found that rates of maritime accidents and personnel injuries, worldwide and in the U.S. fleet, have declined steadily over the last 20 years. For example, data show that accident rates for large tankers (those over 6,000 gross

tons) have declined to about 2 per 100 vessels, a level roughly 20 percent below those of the mid- to late 1970s.

Figure I.2: U.S. Tanker Accidents



Source: U.S. Coast Guard.

In addition to reports of ship casualties, the Coast Guard receives reports of pollution in U.S. waters. Although the number of reported spills from tankers has declined since the mid-1970s, the amount of oil spilled each year varies greatly. In the first 9 months of 1990, the Coast Guard was notified of 303 pollution incidents in which tankers released about 1.8 million gallons of oil and hazardous substances, nearly 24 percent of the oil and hazardous substances discharged into U.S. waters and reported to the Coast Guard that year. Figures I.3 and I.4 show the number of reported pollution incidents involving tankers, and the estimated amounts spilled from tankers from 1975 to 1990.

Figure I.3: Number of Oil and Hazardous Substance Spills From Tankers

Note: Figures for 1990 are complete only through September 1990.
Source: U.S. Coast Guard.

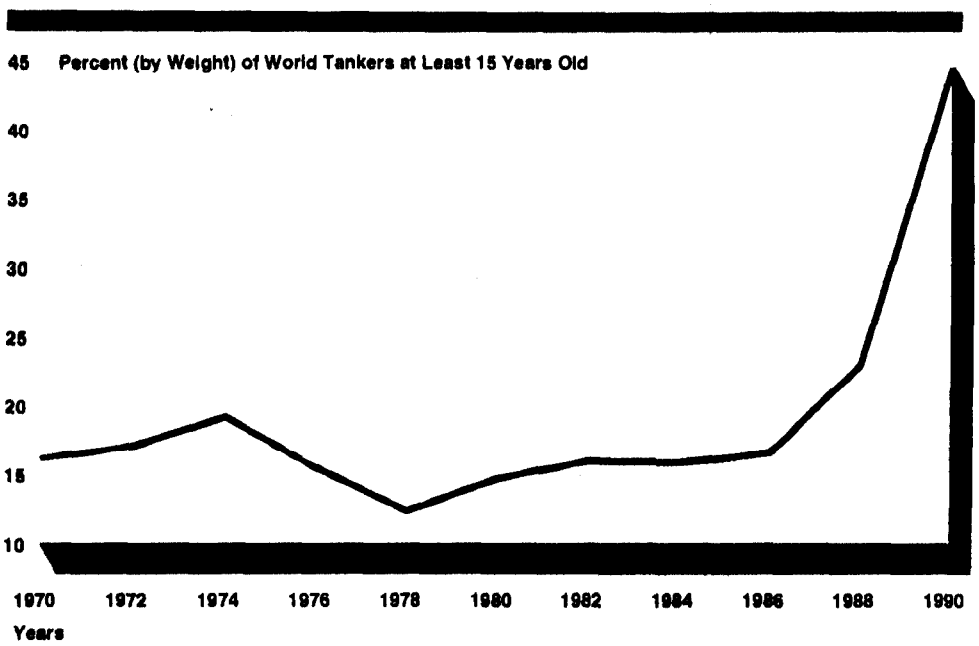
Figure I.4: Amount of Oil and Hazardous Substances Spilled From Tankers

Note: Figures for 1990 are complete only through September 1990.
Source: U.S. Coast Guard.

Age of Tanker Fleet

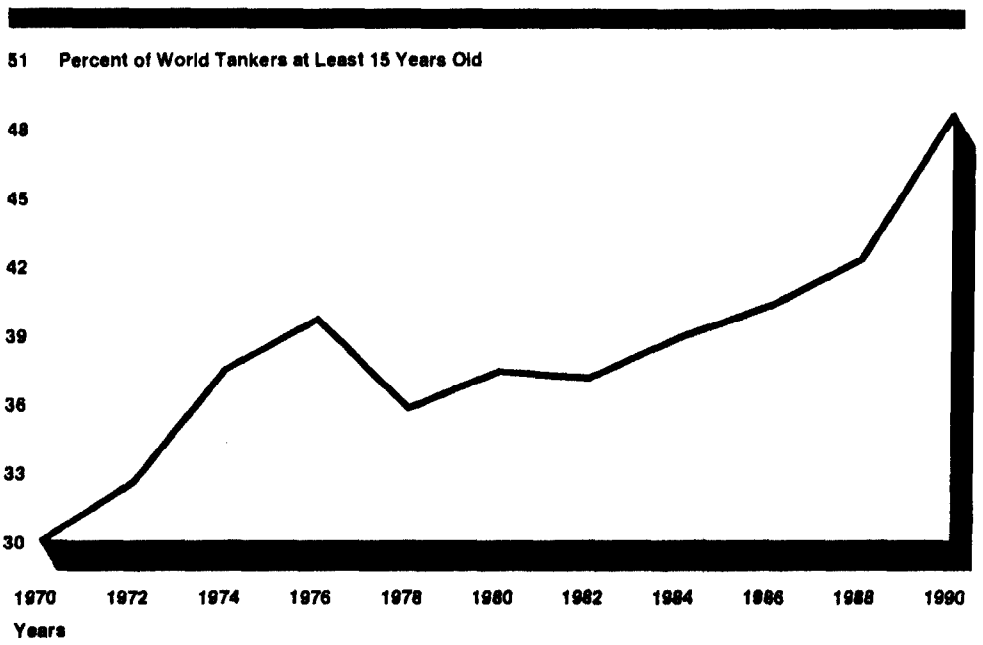
The proportion of older tankers in the world fleet is growing. From 1981 to 1990, the percentage of the world tanker fleet (measured in tonnage) that was at least 15 years old had increased from about 15 percent to nearly 45 percent (see fig. 1.5). The same trend is evident when the number of aging tankers is expressed as a percentage of the number of tankers. As figure I.6 shows, the percentage of the world tanker fleet that is 15 or more years old has increased significantly since 1970, when about 30 percent of the world's tankers were 15 years old or older. By 1990, the percentage of tankers at least 15 years old had increased to nearly 50 percent.

Figure I.5: Percent of World Tankers, by Weight, at Least 15 Years Old



Source: Lloyd's Register Statistical Tables.

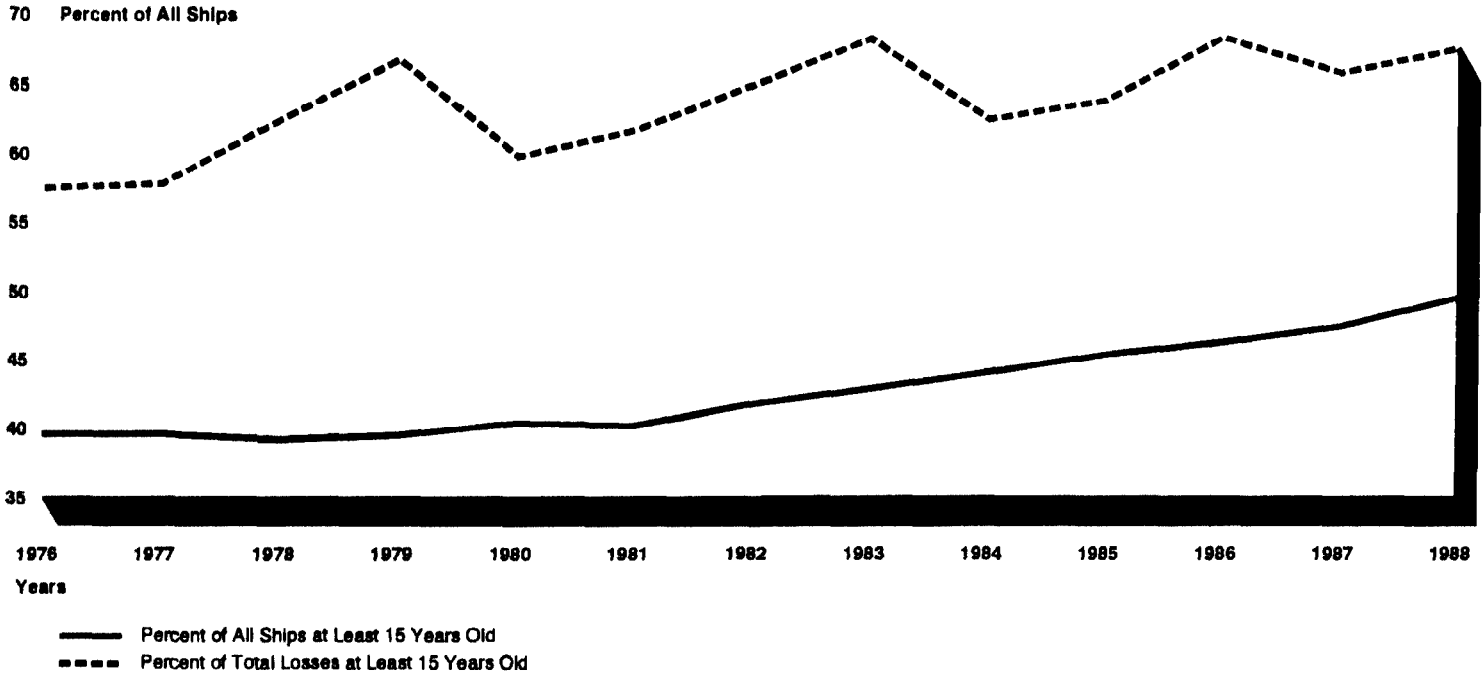
Figure I.6: Percent of World Tankers at Least 15 Years Old



Source: Lloyd's Register Statistical Tables.

Although data on the accident rate of tankers at least 15 years old are not available, data on accidents involving all ships, including tankers, show that the percentage of ships at least 15 years old that are lost because of accidents is significantly higher than the percentage of all ships at least 15 years old. For example, in 1976, when nearly 40 percent of the world's ships were at least 15 years old, about 57 percent of the ships lost because of a casualty were at least 15 years old. In 1988, the percentage of older ships had increased to nearly 50 percent, but the percentage of older ships totally lost remained much higher, more than 67 percent. Figure I.7 shows these percentages from 1974 to 1988.

Figure I.7: Loss Rate for All Ships at Least 15 Years Old

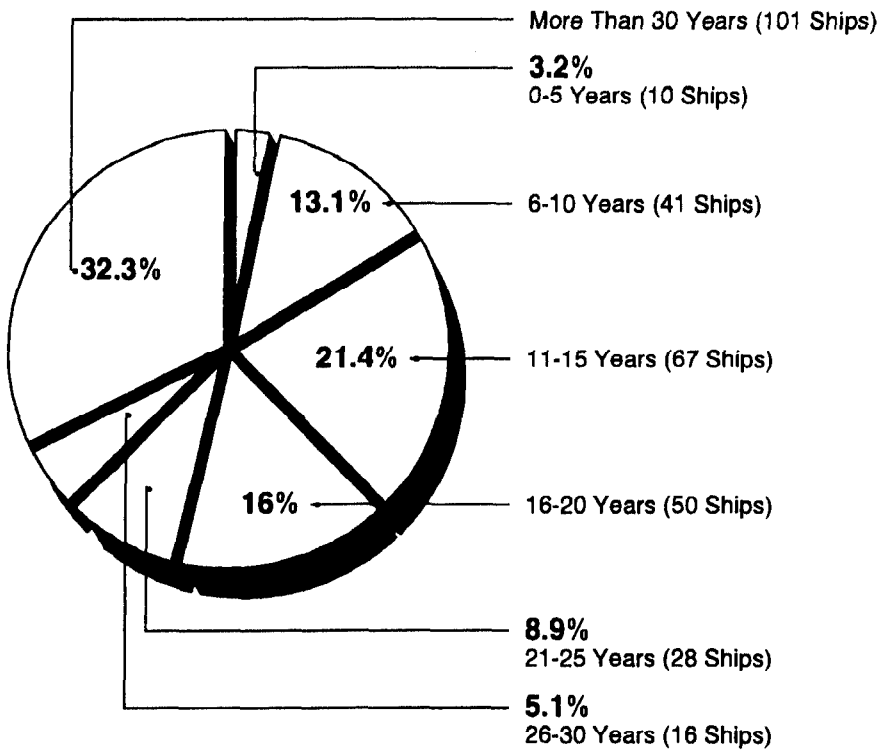


Note: Data not available for age of ships in 1983 and loss rate in 1982.
Source: Lloyd's Register Statistical Tables and Casualty Return.

Compared with the world tanker fleet, the U.S. tanker fleet includes a greater percentage of tankers that are more than 15 years old. According to the Coast Guard, in 1990, more than 62 percent of U.S. tankers were at least 16 years old, while nearly one-third (32 percent) were 30 or more years old. Figure I.8 shows the ages of U.S. tankers in

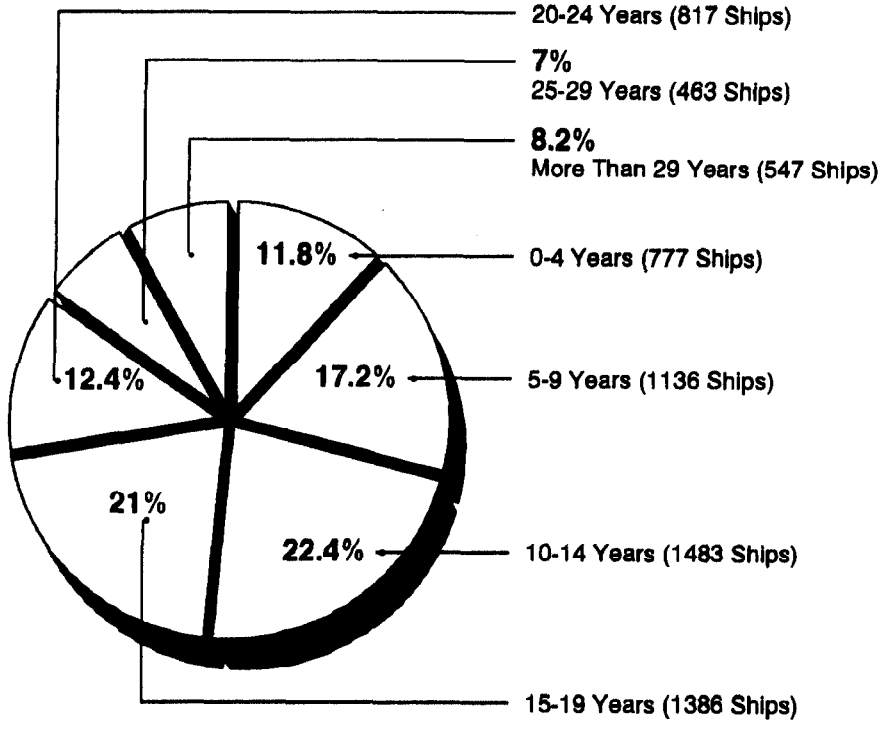
1990. Meanwhile, about 48 percent of the world tanker fleet was at least 15 years old in 1990, and only about 8 percent was at least 30 years old. Figure I.9 shows the age of the world tanker fleet in 1990.

Figure I.8: U.S. Tankers, by Age, 1990



Source: U.S. Coast Guard.

Figure I.9: World Tankers, by Age, 1990

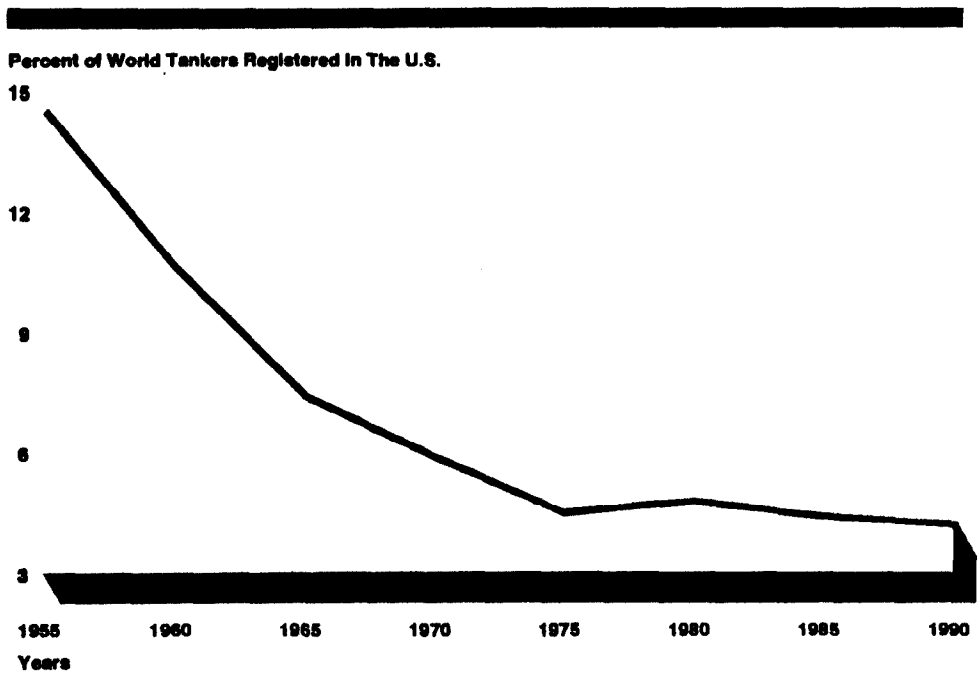


Source: Lloyd's Register Statistical Tables 1990.

Tankers Under U.S. And Foreign Flags

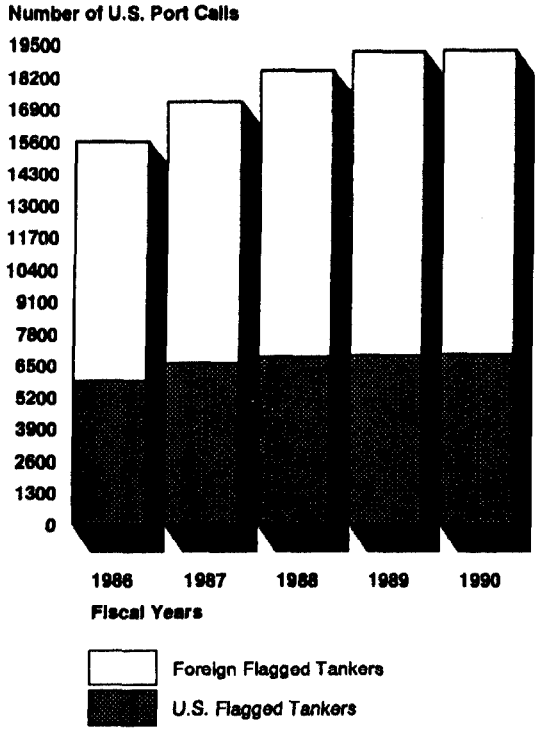
Since the 1950s, the percentage of the world's tanker fleet operating under the U.S. flag has declined significantly. As figure I.10 shows, in 1955, more than 14 percent of the world's tankers were registered in the U.S. By 1990, about 4 percent of the world's tankers were registered in the U.S. In addition, many of the tankers serving the United States are registered in other countries. In 1990, for example, foreign tankers visited U.S. ports nearly twice as often as U.S. tankers. Figure I.11 shows the number of port calls by U.S. and foreign tankers since 1986.

Figure I.10: Percent of World Tankers Registered in the U.S.



Source: Lloyd's Register Statistical Tables.

Figure I.11: Port Calls by U.S. And Foreign-Flagged Tankers



Source: U.S. Coast Guard.

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